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The QL Service Manual is the book issued by Sinclair Research to QL repair companies, and contains all you need to know about the QL Hardware. It has full circuit diagrams including the microdrives, details on various chips and their functions, block diagrams, fault finding and lots more £19.95

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CONTENTS

JULY 1987

NEXT MONTH

Desk-top publishing

Digital Precision have recently launched their Desk Top Publisher, and Gap Software have produced an improved version of Front Page designed solely for expanded machines. Does the difference in price reflect the quality? We look at the facts next month.

Adventurous writings

The Quill adventure writing system has been available on the QL for quite a while, and is the basis of the latest adventure game. The Heart of Gern, reviewed this month. With the new release from Shadow Games of their APT Adventure Writer, we decided to compare these enterprising products.

The roms

What is the real difference between an AH and a JS? How do you upgrade? Is it really worth it? You might be swapping known bugs in an early AH rom for unknown bugs in the later JS version. Next month, we take the lid off the QL.

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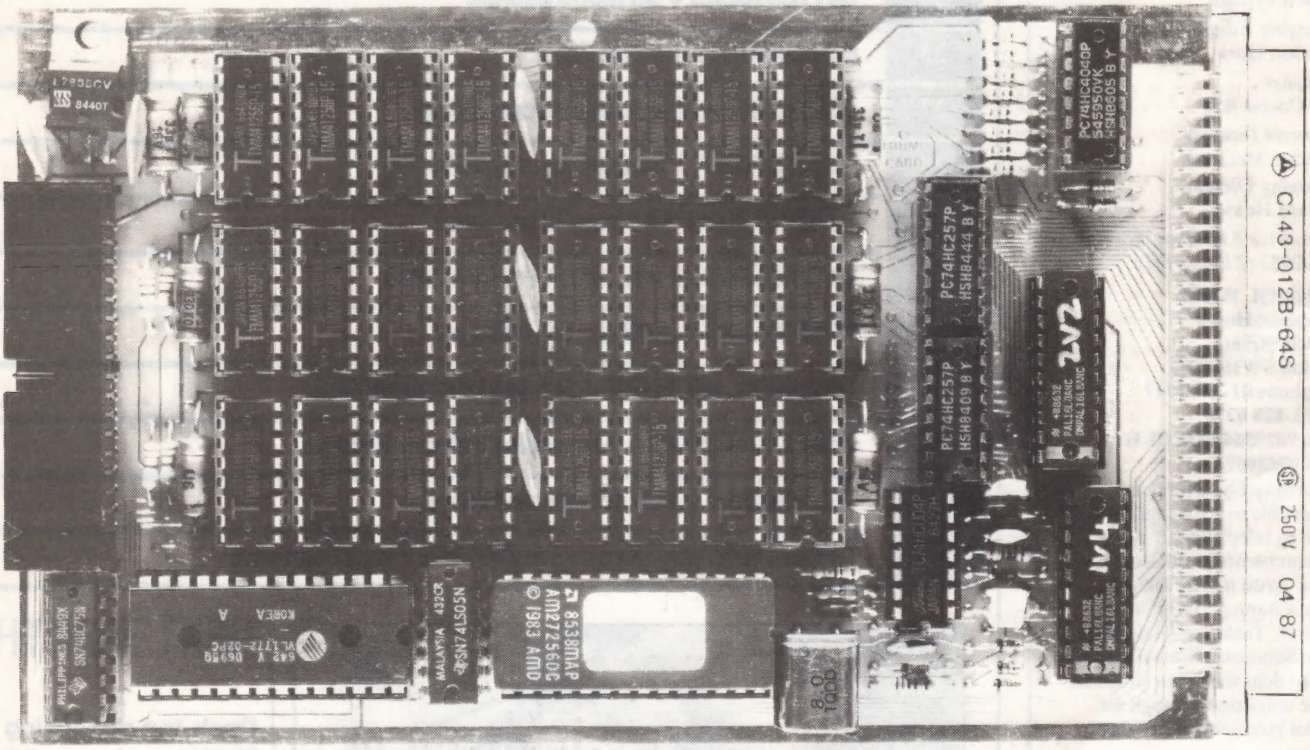

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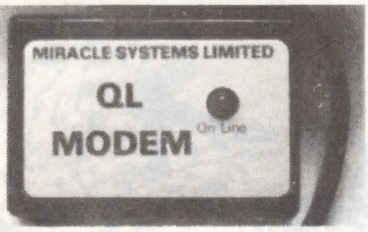

★ 1200/75 e.g. PRESTEL, T/GOLD
★ Autodial
★ 3 metre cable
★ Plugs into SER2
★ Includes Viewdata software
★ Includes 80 column software
★ Not BT approved

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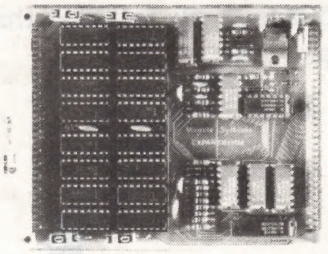

★ Increases QL memory to 640K
★ Through connector for i/f
★ Low power consumption
★ Can speed up some programs
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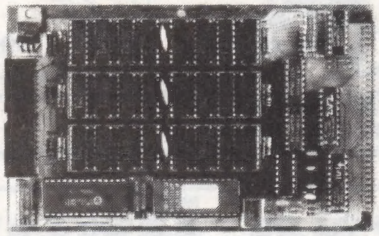

★ Increases QL memory to 896K
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★ Memory Cut
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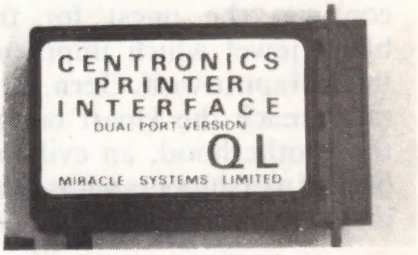

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CP/Mulator plus

The CP/Mulator reviewed in the June issue has undergone an identity change. It is now marketed by Sandy (U.K.) for £44.95.

In addition to the marketing rights, Sandy has added a few items. For instance, CP/M has been seen multi-tasking with Qdos. There is a new advanced file transfer facility to convert files for the QL and the CP/M User Group, which Sandy advises people to join, has a library of more than 7,000 public domain programs.

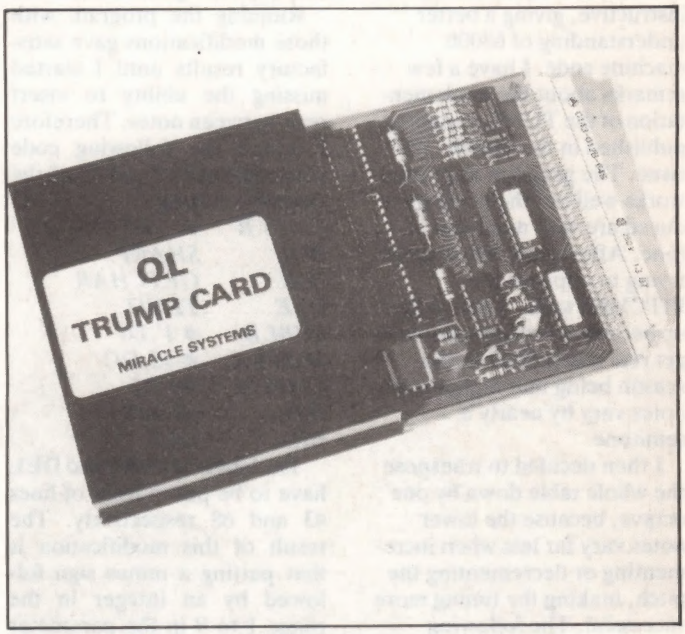
Finally, the updated version is supposed to be much faster than the original. The package includes an EPROM cartridge, a manual and a system disc or Microdrive cartridge.

Coming up trumps

A new RAM expansion card is available from Miracle Systems. Called the Trump Card, it will add an unprecedented 768K to the QL RAM, bringing the total available to 896K.

The external expansion also includes a disc interface for standard 3.5in. double-sided, double-density discs, a static/dynamic RAMdisc facility, Toolkit II, a screen dump utility for a variety of printers, a printer buffer for serial ports, and a memory cut to make a QL look like a 128K machine for all those problem programs.

The software for the board has been written by Tony Tebby. The price for this expansion board is £199. We will look at the board in detail in a future issue.



Seiko Wrist Terminal for QL

The Seiko RC-1000 wristwatch terminal is available for the QL at £49.95. The watch is complete with QL software on Microdrive, an RS232 serial cable and two instruction manuals.

The idea of the RC-1000 is that it lets you create a set of data files on the QL and then download them to the watch for viewing on your wrist. Four types of information can be displayed — memo, yearly schedule, weekly schedule and world times. Each must be created using the software provided. Only the time, the date and a daily alarm can be set from the watch.

The RC-1000 is black with a black metal strap and is about the size of an After Eight mint. That makes it bulky for those with thin wrists. The display is of the two-line LCD type with a maximum of 12 characters per line. Underneath there are six 'chiclet' buttons which control all the watch functions.

Like most digital watches, the RC 1000 gives a shrill peeping sound every hour and half-hour and a repeating peep whenever the alarm sounds. A tiny light lets you browse the time or data in the dark.

The memo function is the most useful of the four sections. It is where you store data like telephone numbers, lists of customers, important dates or events, notes and any information you feel you cannot do without. The software lets you organise data into files, each one identified by a label. Pressing one of the watch buttons lets you select a particular label and then you can scroll through the data stored in it.

The weekly schedule sets an alarm for a particular hour and day on a weekly basis. The alarm repeats at the same time each week. A little less useful is the yearly schedule which works in the same way, albeit on an annual basis.

World time is aimed at the cosmopolitan globetrotter. It allows you to input a list of cities with the times relative to your own. The software makes it easier by letting you input a particular city time zone in relation to yours.

The software is menu-driven and fairly extensive. Any file can be edited and a comprehensive range of functions is offered, including search, delete, goto, erase, cut and paste. Completed files are then transmitted to the watch. Any data already in the watch will be erased and replaced by the new.

Because of the limited storage capacity, there is a trade-off between the four functions. The RC 1000 holds a maximum of 80 lines with 24 characters per line. If you create too large a file in one section you will lose — capacity in the rest. Files can be stored on disc for expanding and amending at a later data. Any number of files can be created and stored in this way for transmitting to the watch when needed.

Although the watch is accompanied by comprehensive instruction booklets, the software manual tries to cover too many computers and may be a little confusing. Still, the Microdrive contains a Quill document which summarises commands implemented specially for the QL.

The RC-1000 is available by mail order only from Data-Skip, L Willemsteeg 10, 2801 WC Gouda, Netherlands.

QL Gold

There have been a few administrative problems with the QL Gold club. Our apologies to anyone who has suffered any delays in receiving the cards or microdrives.

There were also some problems with the first batch of microdrives. If you have a faulty microdrive please return it to: TIL, PO Box 74, Tonbridge TN12 6DW, remembering to quote your Gold Card identity number.

Open Channel is where you have the opportunity to voice your opinions in *Sinclair QL World*. Whether you want to ask for help with a technical problem, provide somebody with the answer, or just sound off about something which bothers you, write to: Open Channel, Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG.

OPEN

Better pitch

I am very pleased with the DIY Toolkit series, as it is very instructive, giving a better understanding of 68000 machine code. I have a few remarks about the implementation of the TUNE command, published in the March, 1987 issue. The program as printed works well but the notes produced are very much out of tune. After many hours spent trying to improve the PITCHES table, I had to give up because it was impossible to get real music from it, the reason being that higher pitch notes vary by nearly a semitone.

I then decided to transpose the whole table down by one octave, because the lower notes vary far less when incrementing or decrementing the pitch, making the tuning more successful. The following PITCHES table gives a fairly well-tempered two octaves:

```
PITCHES   DC.B  96,91,85,80,75                 A,#A,B,B,C,#C
          DC.B  70,66,62,62,58,55,51,48       D,#D,E,E,F,#F,G,#G
          DC.B  44,41,39,39,36,34             a,#a,b,b,c,#c
          DC.B  31,29,27,27,25,23,21,20       d,#d,e,e,f,#f,g,#g
```

I also noticed that the values #27 and #8 in lines 55 and 62 have to be changed to #28 and #9 respectively to allow for the existance of #g and duration 9.

Running the program with those modifications gave satisfactory results until I started missing the ability to insert rests between notes. Therefore I added the following code between lines 42 and 43 of the assembler listing:

```
CMPI.B    #'-',D1
BNE       SHARP
BSR       GETCHAR
BNE       TEXIT
SUBI.B    #'1',D1
MOVE.L    #-15,DO
CMPI.B    #9,D1
BPL       EEXIT
BRA.S     DEL
```

The labels SHARP and DEL have to be put in front of lines 43 and 68 respectively. The result of this modification is that putting a minus sign followed by an integer in the range 1 to 9 in the parameter string produces a rest for the specified period.

F W Hofsteenge, Amsterdam, Netherlands.

Canon correction

I am writing concerning the use of the Canon Typestar 5R mentioned in the October, 1986 issue of Open Channel, and the problem with the pound sign. The ASCII table on page 34 of the Canon handbook does not include this symbol but the local character table on page 35 does. Therefore, before going on-line, set the protocol character code to 'LOCAL' instead of the usual ASCII code, and the pound sign will be printed instead of the hash symbol.

I had the same problem with the connections of the serial lead but eventually sorted out that the blue wire should be shifted from pin 20 on the 25-pin plug to pin 4 for SER1 working.

Ken Lynas, Middlesbrough.

Adventurous objectives

In the May edition of Open Channel, Chris Hopkin wrote asking for a section in the magazine devoted to adventures. He, and I suspect many others, will be pleased to hear that I am preparing to start a magazine entitled *QL Adventures Forum*.

At present I am trying to assess the likely market. Obviously the more feedback I get, the more likely it is the magazine will prosper. It will be at least three months before the first issue appears and I would welcome all letters of support.

Richard Alexander, Cwm Gwen Hall, Pencader, Dyfed, Cymru SA39 9HA.

Brother bother

Your parameters for the Brother HR-5 printer, as printed in the February, 1987 issue, are incorrect. I have had problems using the underline mode in Quill. Once turned on it underlines the rest of the document. To solve the problem, enter the codes in decimal in the INSTALL BAS program. Also TRANSLATE 1 will not work. It is possible to switch character sets only using the DIP switches SW-1-7 and SW-1-8.

An alternative list of parameters may be useful. The Translate commands included enable reduced and enlarged characters to be printed in the Quill document.

```
Driver name:        HR-5
Port:               SER1
Baud rate:          9600
Parity:             NONE
Line/page           66
Characters/line     80
Continuous/
forms:              OPTIONAL
End-of-line
code:               CR,LF
Preamble code:      NONE
Postamble
code:               NONE
Bold on:            27,69
Bold off:           27,70
Underline on:       27,45,1
Underline off:      27,45,0
Subscript on:       27,83,1
Subscript off:      27,84
Superscript on:     27,83,0
Superscript off:    27,84

Translate 1:        'CTRL SHIFT
                    L',27,87,1
Translate 2:        'CTRL SHIFT
                    O',27,87,0
Translate 3:        'CTRL SHIFT
                    R',15
Translate 4:        'CTRL SHIFT
                    C',18
```

TRANSLATE 1 and 2 turn double-width enlarged characters on and off. TRANSLATE 3 and 4 turn reduced characters on and off.

Jeff Bishop, Gillingham, Kent.

Contour plotter

I was impressed and informed by Dr Dormand's contour plotting program in the April, 1987 issue. After several runs I would like to add two comments. First, it seems to prefer an odd number of "Y" points. Second, the gprint prt routine, although efficient, introduces a slight distortion, at least on my Brother HR-5.

Both can be settled by entering 129 points for X, from — 1.1 to 1.1, and 23 points for Y, from — 1.33 to 1.33. A circle of radius one is then almost undistorted.

C R Oswin, Christchurch, Dorset.

Take off

In response to the Grounded letter in the April, 1987 Open Channel, I thought you might be interested in the following. I am an aeronautical engineer and I have been working on a *Flight Simulator* for the QL in my spare time for almost a year. I have been concentrating on writing a 100 percent, machine code routine for producing three-dimensional perspective views from the cockpit. This is now complete and I am working on the instrumentation and flying characteristics. I hope the program will be ready by the end of the year.

It will include filled 3D perspective views of the land and sky, an accurate database of at least 20 U.K. aerodromes and 100 navigation beacons and variable winds, weather, visibility, emergencies, and so on.

The program has been written in a modular format, enabling the inclusion of a feature to change the aircraft type. For example, you can train on a light single, progress to a twin, try your hand at an executive jet, then move to tackle an airliner, possibly gaining experience on helicopters and military jets along the way.

Bernard Denchfield, Bristol.

CHANNEL

Super SuperBasic

I am a late starter to the QL. Just when I had bought the machine, the Finnish agent stopped representing the QL. I have managed to find only two books on the machine, both of which are too primitive and often inaccurate. Could you please recommend a book showing advanced SuperBasic without resorting to machine code?

Timo Mikonmaki, Finland.

•Editor's reply. There are a number of books which purport to teach advanced SuperBasic but they are rarely useful in teaching how to write advanced programs. Instead they deal with a few commands and show a few applications. If you watch our Better Basic section you should see the kind of thing for which you are looking. We are to deal with program structure, design, advanced data structures and so on.

Super service

Recently I bought the QL *Small Traders* pack from SD Microsystems of Hitchin, believing that my Mannesman Tally MT80 printer was sufficiently compatible to run the software. It proved to be almost true, except for a problem with spacing.

I decided to contact SD Microsystems and Mannesman Tally. I took a sample of the poor spacing to Mannesman Tally which then lent me a later model of its printer which has a built-in diagnostic ability, asking me to run the software using the diagnostic routine and send the resulting printout. I would add that the company not only let me have a very expensive piece of equipment but changed the interface to serial for me.

On receiving my letter, SD Microsystems telephoned to say it was concerned with my problem, had examined my printouts, modified one of the programs contained in the "pack" and posted it to me. I was asked to run it and if it solved the problem, return my original together with the modified cartridge and the whole pack would be modified to suit my printer. That was done.

I did not need to bother Mannesman Tally again but it would have attempted to alter the printer to accept the control codes it was receiving. Absolutely first class service.

Finally, something which may be of interest to others. I produce a six-page duplicated price list twice a year. Quill obviously plays its part but I wanted to avoid the chore of typing stencils. My enquiries met with blank stares or firm assurances that it could not be done with a dot matrix printer.

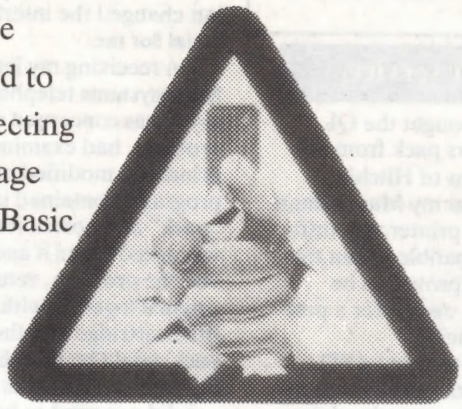
Logic suggested that if the printer could produce an original and two carbon copies there should be sufficient impact to cut stencils. I have altered the printer driver to accept double strike and by removing the printer ribbon and using very fine membrane 'printwheel' stencils the result is acceptable. Admittedly it is not so good as a daisywheel or golfball but very much faster and easier.

Stanley Sach, Beech Hill, Berkshire.

TROUBLE

APROBL

Bryan Davies looks at more common problems designed to baffle and infuriate unsuspecting QL users. This month voltage spikes and compiled SuperBasic programs get the Trouble-shooter treatment.



A friend of mine raised two points which must apply to other readers. The first concerns something which can happen to any QL — lock-up. If operation of domestic lights or appliances causes flashes on the screen, voltage spikes are occurring which may be big enough to shut down the system and something should be done to get rid of them.

Do not believe that just fitting suppressor plugs or adapters will cure the problem; it might but it is possible that it will only reduce the frequency of lock-ups. The cheapest device, and possibly the most effective, is the Varistor — variable resistor; fit one to every 13A plug connected to an appliance which may be causing trouble, e.g., refrigerator, freezer, vacuum cleaner.

Fit them to the system unit plugs also. Fluorescent lights can cause spikes and it may be necessary to open them to fit a Varistor internally, between live and neutral. Further distress, in the form of chip failure, can be avoided by adopting a set procedure for switching on. Your printer manual will probably advise you to power on and off in this order — printer, other devices, e.g., disc drives, computer — to avoid spikes produced by the relatively high start-up and power-down current drawn by the printer affecting the QL chips.

As all my system units are connected to the same four-way adapter, I switch everything on and off together from one switch and have not noticed any trouble resulting from this procedure in two-and-a-half years. What is certain is that switching printer or disc drives on and off while the QL is on is bad practice.

The second point concerns compilation of SuperBasic programs, using *Supercharge* or *Turbo Supercharge.* You do not have to use the compiler for long to realise just how badly-written many SB programmes are; the compiler will produce a bunch of warning and error reports on many programs. The warnings will often be mainly about failure to dimension variables and it is possible to leave the compiler to give default dimensions but this may not be satisfactory if the program is large and requires many DIM statements.

Default size

The default size allocated may be larger than necessary in many cases; if so, it is desirable to add the appropriate DIM statements to the SB program. The word "ambiguous" can appear regularly in error messages from the compiler and it will often be caused by the use of a "familiar" string of characters — familar to the QL, that is — or by using the same string for two purposes. An example is referring to a string variable as STRING$ or LEN$; if you have seen a string of characters used in the Keywords section of the User Guide, do not use a similar string to identify a variable or procedure in your program.

If, you are not clear about what the words assemble, interpret, compile and so on mean, you may be baffled by the running battle between the producers of *QLiberator* and Supercharge/Turbo Supercharge. On the basis that any noise is better for business than no noise at all, the effort expended on this subject may well have been repaid in sales revenue. It might be worth repeating a few points as a guide to the would-be purchaser.

The word compile, when used in the computer world, has a more specific meaning than when used in daily life. In the case of the QL, compiled code can be run directly by the 68008 main processing chip. Both forms of Supercharge produce such code. It is possible to produce an intermediate form of code which is not interpreted and run line-by-line at run-time, as SuperBasic is, but nevertheless is not run directly by the 68008.

Slower code

QLiberator produces such code. The need to pass through an intermediate stage inevitably makes the code produced by QLiberator run slower than that from Supercharge or Turbo. There is the more general aspect of the word compile to consider — a program which is called a compiler should be able to take programs written in SuperBasic and produce code which will run much faster than the original SB code. The three programs on the market differ somewhat in their willingness to convert SB programs to faster-running code.

QLiberator is more agreeable to accepting badly-written SB, whereas Supercharge objects strenuously to it. Turbo is somewhere in between, because effectively it can re-write some bad SB and then compile it. There is still debate about just what the rules of SuperBasic are and it can be argued that none of the three programs is completely compatible with SB. You may have to do some re-writing of your original code for all of them before being able to produce fast-running code which also runs as the original did.

Certain choices seem obvious; if you cannot, or will not, write good SB, QLiberator is your best bet. If you can write good code and want the maximum speed of running, Supercharge or Turbo are the ones, the latter being much the better. The latest version of Turbo, compatible with *QRam,* is 1.14; compatible versions of Editor are 1.17/1.18.

What happened to Technology Research, the company which sold the Delta interface? Can anyone supply its current address and telephone

SHOOTER

EMSOLVED

number? The reason for asking is a problem which occurs using two Delta 128K interfaces. One had the version 1.12 EPROM, the other had 1.14. It was decided to have a copy made of the 1.14 chip, since TR could not be contacted to obtain another one. It was done but the QL to which the updated interface was attached soon developed a problem — the start-up screen would not come up reliably and, eventually, there was no screen picture.

The symptom is a sign of a defective 8301 chip, next to the main processor, according to the QL Service Manual; sure enough, five minutes later, the QL was working well again, with a new 8301 fitted. In the meantime, a second QL was being used with the other interface but that one developed the same symptoms.

Investigation revealed that the 8301 had failed in that also. The interface in this case had the original 1.14 chip, not a copy. Both QLs had worked well without the interfaces but had failed shortly after they were fitted. There was also a test with a third QL, which worked well for hours with the copy 1.14 chip, then started giving screen problems; with the 1.12 chip fitted, all was well again.

Same combination

Refitting the 1.14 chip with the legs cleaned seemed to solve the problem but it was that same interface/chip combination which was fitted when the second QL malfunctioned. The implication appears to be that there is something wrong with both 1.14 chips which might be explained by saying the copy was not a good one but the original was as bought, unless something had been done to it while the copy was being taken from it.

An interesting sidelight on this episode was the variation in performance of the QLs with different 8301 chips fitted; the flashing speed of the cursor was frenetic with the replacement chip but a benchmark memory speed check showed one repaired QL to be appreciably slower than another which had not been touched — 46 seconds against 32.

The original reason for changing to the 1.14 EPROM was that NEC disc drives appeared not to work with the 1.12; on checking the 1.12 with Mitsubish drives they worked, and that is because neither manufacturer seems to stick fully to its own specification. Like it or not, you have to think of such considerations when buying add-on units; always try to test such units with your system configuration before buying them.

Responses

E G Dawson has offered to copy version 1.01 of the Quest disc operating system program for I J Bottomley — address details have been sent direct.

J R Dufton reports that 4 Systems did not deliver items ordered, despite accepting payment for them, but he has now succeeded in getting the money back from Access. If an order has a value more than £100, payment by credit card can give some protection against default by the supplier and it is a much safer way of paying than by cheque or postal order. On a more cheerful note, Dufton says that he has had "excellent service" from Tandata, TK Computerware, Zitasoft, Gap Software, Miracle Systems and Digitrix.

I Lewis has been having difficulties running and backing-up three programs. As problems occurred with several program cartridges and discs, it is likely that there is something wrong with his system, or that he is not following the instructions properly. Regarding the system, Digital Precision commented that no memory expansion is fitted but disc drives and Toolkit and front-end software are in use; the memory space required by the three programs *QSpell, Editor* and *Professional Astrologer,* is unlikely to be available with such a configuration. All the programs have been on sale for many months and work correctly on systems with sufficient memory available; the number of copies sold is in the thousands, so there cannot be serious problems in the software. In that case, the thing to do is buy a memory expansion module, preferably 256K or more.

Chromagraphica has not responded to a request for information on a monitor ordered by reader H M Mortenson of Angered, Sweden. If anyone knows the current address of the company, please let me have it. The same reader asked about availability of the Dutch Velotype keyboard; does anyone know of such a keyboard which is suitable for the QL?

J Pemberton-Bates has an MCS 512K external memory/interface PCB, together with a basic Toolkit and utilities, which worked until he had a Sandy Q-XT640 keyboard and disc drive kit fitted. He now finds that he cannot use the MCS utilities, nor Talent programs, although Psion programs work. Do any readers have experience of this problem and can they offer any solution?

H E Milton asked why he had not received the newsletters and free copies of *QL World* offered when joining the Psion Support Scheme. As I expected, Psion's answer was that the scheme it ran did not include free offers and it suggests Milton has confused the Sinclair scheme with its own. The Sinclair offer ceased with the company when the QL rights were sold to Amstrad. Psion continued to provide support but only if members paid a yearly fee.

Postage

Two pieces of advice from a supplier when returning goods — ensure they are packed well and send them by registered post or recorded delivery. Some items are packed so badly that they arrive smashed and nothing can be done to check the customer's complaint about their operation; others apparently never arrive at all. While it is believable that a few items are lost in the post, it is really not an acceptable explanation for non-arrival of returned goods. The Post Office is often blamed far too much for what goes wrong. Suppliers become rather cynical about such explanations; they feel that such items are more likely to have been incorrectly addressed, packed so badly that the address becomes unreadable, or even not sent at all.

In the same vein, it is suggested that some items returned for refund, because they do not work, have been returned because the purchaser decided he did not really want that particular item and was not prepared to say so, or, worse still, after a copy has been made of an unprotected program. Unfair comment? Applied to the majority of purchasers, it would be unfair but suppliers have to deal with all types and there are bound to be some who "try it on".

Under th

Before even starting such an article about the Thor 20 and who will buy it, it is obvious that there will be readers who will feel their particular interests have not been dealt with. There is such a wide range of QL types — the commercial program writer, the scientist, a variety of authors, the local vicar. To try to cover the points which will be important to the kind of person expected to buy the new Thor, I asked David Oliver of Cambridge Systems Technology, whose baby the machine is, whom he sees as buyers. The answer was "existing Thor customers — technical users, such as the BBC, 68000-software developers, business/office users". There is no reason for the Thor 20 not to be used in a normal office environment, provided the software to be used does not have to be PC-compatible.

Certainly the price range makes the Thor an attractive proposition when compared to current IBM machines or to some of the compatibles; from a performance standpoint, the Thor 20 must be compared to the new generation of 386-chip machines and it is at the lower end of their price range.

For the software developer, the attraction is perhaps more obvious. The QL is a useful tool for those writing programs for other 68000 computers and some authors have already upgraded to the Thor 1 models, so the step to the Thor 20 is a logical progression. It is a more powerful machine, at a price which is well below the obvious competition — the Motorola VME series at, typically, £5,000.

Performance

The Thor 1 uses the same PCB as the QL but it operates rather better than the QL, without providing a sensational performance improvement. It is packaged better, has a more-useful form of the Psion quartet, employs a conventional keyboard, and offers a hard disc. More than 300 have been sold — not a great number by Amstrad standards but CST aims to sell what it can reasonably produce and support and makes no grandiose claims. If it sells as many of the Thor 20, it will feel it is successful.

It is, however, in a position to produce considerably more and will be extending distribution to increase the penetration of the market. The price range for the new machine was roughly £1,200–£2,300 including VAT until the end of June; about £100 more after then. You have to provide your own monitor and printer. That is a big step up from current QL prices but anyone employing the computer for business purposes should give it serious consideration because of its performance. The price range quoted

e hammer

is for the 12.5MHz versions, identified as Thor 20 without the floating point co-processor, and Thor 21 with the FPC; the 16.7MHz Thor 20/21-16 with the 68030 chip is likely to be around £500–£700 dearer and can be produced now if there is the demand for it. There are still some small problems with the FPC function to be sorted out but delivery of the first Thor was expected early in June.

How fast? is a question deserving of criticism, because there is no single, simple yardstick for measuring speed but it is necessary to give a guide to the improvement and the benchmark values in table one are provided for the purpose. It is reasonable to say that the Thor 20 is several times as fast as the QL on specific tasks. The RECOL command operates about four to five times faster.

Upgrades

While the Thor 20 cannot be a full 32-bit machine, because the 8-bit QL is still an integral part of it, it is a big step in that direction and it is intended that there will be full 32-bit versions at a later point in the development cycle. By that time the QL PCB will no longer be part of the machine but it will have served its purpose well. The 32-bit machines will have cache memory for both instructions and data.

The existing Thor 1 is the basis for the Thor 20 and the QL is the basis for the Thor 1. You have, therefore, a QL PCB, packaged in the familiar Thor casing with a RAM expansion board below it, a small board containing the 68020 chip and its associated components piggy-backed above the QL 68008 chip, and another small board containing EPROMs. In addition, two ROMs are changed in the Thor 1.

Existing Thor owners can have their machines upgraded to Thor 20s. The clock speed will be 12.5MHz at present; 16.7MHz is being offered but it is expected to be of interest only to those who need extensive calculation in their programs. The relationship between the 68008 of the QL board and the 68020 of the new board is too close to say that they are independent processors linked just by a data bus but the 68008 will restrict data transfer between them to 8-bit mode.

It is not true, however, that this factor prevents the computer operating faster than the QL. The processing will be much faster, aided by the 68020 cache-memory feature, which enables instructions which have been processed recently to be executed faster subsequently. The screen-handling is much faster, too. if you have seen the swining pendulum demonstration on the Thor 1 at Microfairs, you could not fail to notice that the leisurely pendulum now moves like a windscreen wiper on the Thor 20. Yes, even Quill looks fast.

The price range quoted allows for the optional maths co-processor chip, the MC 68881. It adds about £200 to the basic price and will be worthwhile where extensive calculation work is done. Complaints are sometimes voiced about the limited precision of the QL floatingpoint arithmetic, which is nine digits although only seven are printed, but that is better than some other forms of Basic. The full nine digits can be had by compiling SB programs with *Turbo Supercharge* and it is expected that the program will run on the Thor 20.

Scientific users have an obvious need for precision but there are more everyday requirements, such as simple money calculations in countries like Italy — current exchange range about 2,100 lire to £1, that is £1 million is about 2 x 10^9 lire. There are already some reasonable CAD programs available for the QL and enhanced forms can be expected for the Thor 20. To make the most of the speed improvement gained by using the FPC, programs need to be re-written and compiled.

Disc drives

One or two 720K 3½in. disc drives can be built-in or one 720K disc drive and one 20MB hard disc drive. It is planned to offer a dual drive unit in the present single slot and a 40MB hard disc. An 84-key IBM AT-style keyboard is connected by flexible cable. Keyboards can be provided for the U.K., Denmark, Germany, France, Sweden and Greece; Italy, Spain, Iceland, Turkey and the Soviet Union — Cyrillic — will be catered for later. Although different ROMs have to be fitted to give the national error messages, selection of the character sets is controlled by software — the one basic keyboard allows selection of the different languages, although the key caps obviously have to be changed to match.

As the keyboard is the same as used on IBM systems it provides functions such as Cursor-to-End-of-Line and Delete as single-key operations; there is a numeric pad with the cursor keys included in it. One detail feature I like is the key on the right of the pad which allows you to select either the hyphen or underscore, depending on what work you are doing; it means that I could avoid my persistent problem of keying the hyphen when needing the underscore for device and file names in SuperBasic.

SuperBasic, in the form of the interpreter, is still there; it is part of the QL PCB. It means that existing QL software can be run but that is not a blanket claim for all programs; there will be some programs which will not run or will need modification to run, and only those written for the JS or MG ROMs are fully-supported.

Compatibility

Programs which run on Thor 1 will run on Thor 20. The operating system is still Qdos, with the bugs by-passed, and with the enhancement of the 68020 features; "last-line recall" is incorporated, as are the Tebby Toolkit networking commands. Other Toolkit commands are included but mainly those which are needed by business users rather than the more technical ones.

The screen resolution is the same as for the QL. A switch-mode power supply is installed; this type of supply is much less prone to passing-on mains voltage spikes than the type used with the QL, which permits so many lock-ups. The ports are the same as on the Thor 1 and use the same connectors. A Microdrive unit can be connected by means of a cable which is fed through one of the slots at the rear of the casing. It permits protected software to be run with the master cartridge in Microdrive 1.

Additional, external floppy and hard disc drives can be added, connected to a standard 64-pin expansion connector. A mouse is an extra-cost, plug-in fitment. Serial and parallel printers can be

connected and there is a 32K buffer for the latter; a spooler is provided for ASCII files. The Q-488 instrument interface and QEP-III EPROM programmer can be connected. Such interfaces as the Midi for music will no doubt be introduced by other companies — Oliver says he is not sufficiently knowledgeable about music to handle this project. The Ice front-end is provided but on disc instead of ROM and not very different from the current product; it is anticipated that the desk-top features will eventually be part of the operating system and be more in line with current competitive offerings.

RAM is only 640K, with no present plan for expansion. The reasoning is that 640K is sufficient if the programs using it are not wasteful of space, as the QL versions of the Psion programs are but *Xchange* is not. In addition, the reasons for using RAM to hold data are now not so strong — there is a fast 20MB disc available. Of the memory 512K is of the external type; it is appreciably faster to access than the normal 128K of the QL. In addition, programming now allows specific access to the fast part of memory — not possible on the standard QL. Those who complained that the Thor 1 would not run games programs because it did not have a QL-type keyboard should be happy now, as the Keyrow command is supported — it will now also be provided as an emulation in Thor 1.

There are four slots for EPROMs, each of 32K size. The EPROM PCB also houses custom chips, including one which effectively serial numbers the machines and provides copy-protection in a new fashion. The reasons for the Xchange suite not being provided on ROM/EPROM are that updating is awkward and the space required is about 180K; using so much space would seriously restrict the ability to have other firmware. There is no 7.5-12.5MHz speed switch for new and old software, as used on PC-compatibles, there being no need for one. The physical difference between 12.5 and 16.7MHz versions will be just two different chips and different crystals.

Psion suite

The Psion Xchange suite is provided on disc. It means that the Psion quartet can all be loaded at the same time; sharing of the code allows several files to be accessed by each program, saving much memory. Obviously this is not full multi-tasking but the QL always had some capability for this and that is now extended; the CTRL C function has been replaced by a "system request" and it is possible to have other compiled or machine-coded programs running alongside Xchange.

Programs, Psion included, are accessed by single presses of the "Sys Req" key. The Psion programs are somewhat better versions than on the QL and some odd bugs have been sorted out. The Xchange version used for this review of the Thor 20 was 3.86 but there is a later version; there has been no need to re-write it for the Thor 20.

The suite is essentially the same as used on PC-compatibles. For those who have not used Xchange, the improvement over the separate programs on the QL is well worth having. Quill has Export and Transfer functions, the latter allowing a file to be saved without control codes. The cursor movement is significantly faster, removing possibly the main irritation from the use of this program.

Development

When using the Psion quartet, the Thor 1 is about 15 percent faster than the QL and the Thor 20 is about 20-30 percent faster than the Thor 1, giving a speed improvement of around 40-50 percent over the QL. Those figures may not sound sensational but the subjective improvement in the feel of Quill, for instance, will be considerable.

It is not intended to provide MS-DOS emulation, i.e., PC compatibility, because the cost would be greater than that of buying a cheap alternative computer and linking it to the Thor RS232 port. The new IBM PC eventually will have a new operating system anyway. CP/M emulation will be considered but that operating system is now rather too long in the tooth to be bundled with the Thor. It is not surprising at this stage in the development of the Sinclair Z-88 that there are no plans to link it to the Thor. The Psion Organiser will certainly be linkable. There is also a possibility that existing customers will develop a printer driver for a laser printer.

For software developers, CST supplies full documentation for the Motorola MC 68020 and MC 68881 maths co-processor and an extended macro assembler from Talent which supports the full instruction sets for those two chips, plus a linker from GST.

The QL appears to be relatively more popular overseas than in the U.K. and the same is expected with the Thor. Strong interest has already been shown from Scandinavia and Italy and those other great fans of the QL, the Germans and the Spanish, will no doubt be buyers. Even for those who cannot aspire to such a machine, the Thor 20 will be a boon, because of the extra lease of life it will give to its forefather, the QL. It will encourage hardware and software developers to continue working on products which have relevance to us all.

Table 1
Speed comparisons
BM1-8, MAC1-4 and PRIMES are SuperBasic benchmark routines from David Guthrie, in the Quanta Library; PRIMES(TBO) is PRIMES compiled, using Turbo Supercharge. The routines were run with the computers in F1 mode; some routines would take longer in F2 mode.
The memory speed check is from the Turbo Supercharge compiler manual but is a SuperBasic routine. All times are in seconds.
It should be borne in mind that individual specimens of the same model vary appreciably in speed.

Routine:	Basic QL:	640K QL:*	256K GL:*	Thor 1:	Thor 20:
BM1	1.9	1.6	1.4	1.6	1.2
BM2	5.7	5	4.3	4.7	4.3
BM3	9	8	8	8	7
BM4	10	8	7	8	7
BM5	12	10	9	19	9
BM6	26	22	20	21	19
BM7	42	36	32	34	31
BM8	22	18	16	18	15
MAC1	89	74	67	72	63
MAC2	18	17	17	16	11
MAC3	57	49	45	49	28
MAC4	81	80	81	79	54
PRIMES	254	212	193	205	189
PRIMES (TBO)	26	18	14	16	17
MEM_ SPEED	32	22	17	17	4
DEMO_ TURBO	10	6	4	#	3
DEMO_ QLIB	32	19	15	#	14

*The 640K QL had a 256K MP internal expansion and a 256K PCML external expansion. The 256K QL had a 128K TR external expansion; this is about the fastest QL set-up.
DEMO_TURBO/QLIB is a set of four routines for creating and sorting numeric and alpha strings. The TURBO version was compiled by that program and uses six character strings; the QLIB version was compiled by that program and uses four-character strings. It is the current phase of the long-running Turbo Supercharge versus QLiberator saga!
#The Thor 1 used was one of the originals and did not have Keyrow emulation, so that it could not run all four parts of these two tests; from the timings on the first part, totals of about three and 14 seconds would seem likely. It also appeared that the QL PCB in this machine was slower than the one in the 256K QL with TR expansion.

TURBO *V1.14*

"Dramatic . . . . bug free . . . . an excellent program . . . a great advance on Supercharge . . . . more capable (than the latest version of QLiberator) . . . . the fastest SuperBASIC compiler so far . . . . mind-bending . . . . takes SuperBASIC and the QL into a new era . . . . With TURBO we should start to see programs which are unthinkable on any other small micro"

QL WORLD, April 1987

STANDARD	PERSONAL 1	2	3	4	5	6	7	INT MATH	REAL MATH
SuperBASIC	1.7	4.8	7.9	7.7	10.0	20.2	36.5	10.4	13.2
TURBO (float)	0.1	0.2	0.5	0.7	0.8	1.7	2.4	n/a	0.6
TURBO (int)	0.05	0.08	0.2	0.15	0.25	0.55	0.9	0.15	n/a
vs SuperBASIC	3400%	6000%	4000%	5100%	4000%	3700%	4100%	6900%	2200%
vs QLIB v3.x	200%	500%	350%	470%	300%	240%	240%	300%	230%

* ALL tests performed on JS QL + Sandy 512K expanderam - ratios with AH/JM QLs or faster RAMs are even more favourable to TURBO. QLiberator was set for its maximum speed. The benchmarks tell a remarkable story - TURBO produces code that typically runs THREE HUNDRED PERCENT faster than does the QLiberator interpreter. The figures are crushing - its like comparing a Lada with a Lamborghini (but without the price differential)!

STOP PRESS! stop press! STOP PRESS! stop press! STOP PRESS! stop p

* In the May/June 1987 issue of FORUM, QLiberation provided their own demo benchmark - chosen, written & compiled BY THEM... Shame they didn't test it with TURBO! The TURBO'd code is not only more concise but is OVER FOUR HUNDRED PERCENT FASTER! Ouch!! Proof has been lodged by DP with QL WORLD and its troubleshooter. Other painful (to them) examples include simple string concatenation (10 DIM A$(32000) 20 FOR Z=1 TO 32000:A$=A$&"X") where TURBO is an amazing TWO THOUSAND ONE HUNDRED PERCENT faster than QLib.

* Many users have compared DP with Borland,the leading software producer for IBM clone machines. We are not that flattered, as comparing our TURBO QL benchmarks with BORLAND's TURBOBASIC shows that we are 15 times (6X on floats) faster than they are!

Here are some of the companies who have benefited from SUPERCHARGE/TURBO technology: QL USER/WORLD * QUANTA * CST * DS * EIDERSOFT * PDQL * PYRAMIDE * DANSOFT * ULTRASOFT * WD * MIRACLE * HISOFT * SHADOW * TRANSFORM * CURRY * ABC * SECTOR * TESSERACT *

COMPATIBILITY: TURBO will intelligently compile any correct SuperBASIC program (except for interpreter-only words like EDIT). Unlike the interpreters (the one that's free and the other one) TURBO does not blindly accept dangerous rubbish (eg; 10 DEFPROC NAME1 20 REP LOOP 30 ENDDEF NAME1 40 ENDREP LOOP - try this in SuperBASIC): TURBO autocorrects bad programs. Both interpreters are rather stupid - they are unaware of faults, with the result that programs often run erratically (FREE ON RECEIPT OF AN ORDER OR AN SAE - DP's "LIST OF SIXTY WORST INTERPRETER BUGS"). The sad fact is that your interpreter not giving an error message is NO GUARANTEE that your program is working in the way that you think it does... For safe programming you simply can't do without TURBO.

☆ Supremely easy to use – a beautiful front-end, on-screen help, instant abort, no LENSLOK, window adjustable during compilation, multitasks while compiling, adjustable buffer size/window copying/DATASPACE from front-window, user configurable to avoid boring keybashing, adjustable report file (to screen/printer/file etc.) in full or condensed format, etc.

☆ Supremely flexible task communications – use PRINT and INPUT to communicate between any number of multitasking jobs – even arrays can be passed, and channels can be shared! Option strings can be passed as parameters of EXECUTE.

☆ Supremely free from restrictions – you can use procedures or functions in any task from any other task! Generate tasks as large as the QL's 640K RAM – or go down the modular route (we supply a program to help you) and instantly link.

☆ Supremely Servile (!) – **TURBO** lets you choose between switching diagnostics on/off (off = shorter code), and between setting optimisation to global speed/localised speed (on a statement block basis) ★ size ★ size with localised speed ★ none; a total of 15 options. You are in the driving seat. If you slip up, we give you a report that pinpoints your mistake, exact to the character!

☆ Supremely feature-filled: Virtual arrays, rubber arrays, implicit datatypes (accelerated, fully re-entrant Integer FOR loops and integer/STRING SELECT on all QL's), full WHEN ERROR trapping of any error on any QL version to a single point (error handlers – you can have any number of them, hierarchically laid out – have full access to line and error numbers, and you can RETRY or CONTINUE/RESTART as you choose) even when in another task, parameter passing by reference as well as by value, 9 digits of displayed accuracy, etc.

☆ Supremely powerful **TOOLKIT** included, with **ONE HUNDRED AND EIGHTY (!!!)** really useful commands, utilities and functions for the BASIC programmer. There is no space to even begin to list them – suffice it to say that **TURBO TOOLKIT**'s most 'comprehensive' rival has little more than half as many features. The **TOOLKIT** (which is RAM based) is designed to complement existing toolkits (e.g. the Supertoolkit!)

☆ Supremely documented – a **THREE HUNDRED AND FIFTY A4 PAGE**, lucid, illustrated user encyclopedia.

☆ Supremely generous – there are no royalty restrictions on **TURBO**'d programs.

The TURBO System costs £99.95 COMPLETE

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TALK BACK

Charles Gerrard puts himself into the psychatrist's chair as he takes apart the famous Eliza conversion program and finds what makes Eliza tick.

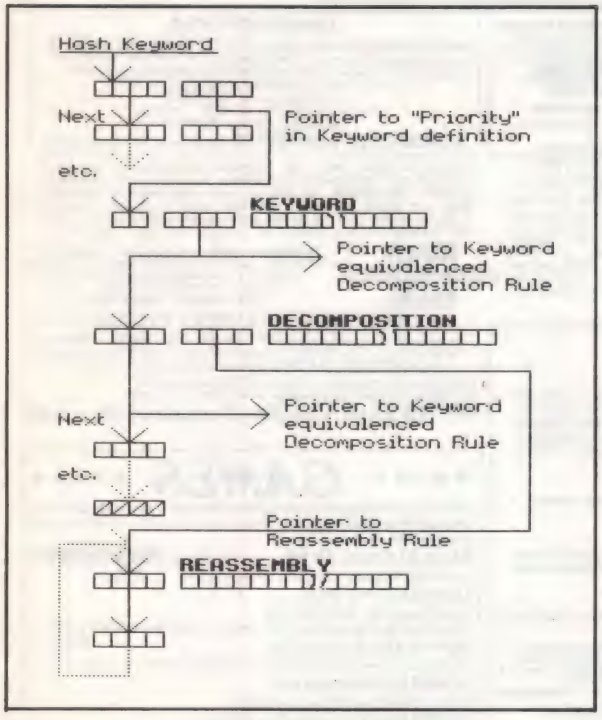
One of the reasons people enjoy working on computers is that they rarely talk back, other than with the obvious "Syntax error at line...". It would be more interesting, however, if the computer could sustain a slightly more informed and intelligent conversation.

In this article, we develop a program which will converse rather crudely in natural English. The two programs which illustrate the idea are available through Microdrive Exchange, called *Psycho*.

A program which will converse with the user in natural English is not a new concept. As long ago as the mid-60s, Joseph Weizenbaum wrote his famous *Eliza* program. It was written using a list processing language known as MAD-SLIP.

The best-known version of the program — the DOCTOR script — was designed to act like a Rogerian psychotherapist. That application was particularly suited to programming, as the psychiatrist is not supposed to add anything to the conversation but instead to prompt the patient to talk further. So, for instance, if the patient said something along the lines: " I have a particularly large kitchen" the psychiatrist might answer with something like: "Tell me more about your house" or "Do you enjoy cooking" without appearing ignorant of the subject. If that kind of reply occurred during normal conversation, you would probably give the speaker some strange looks.

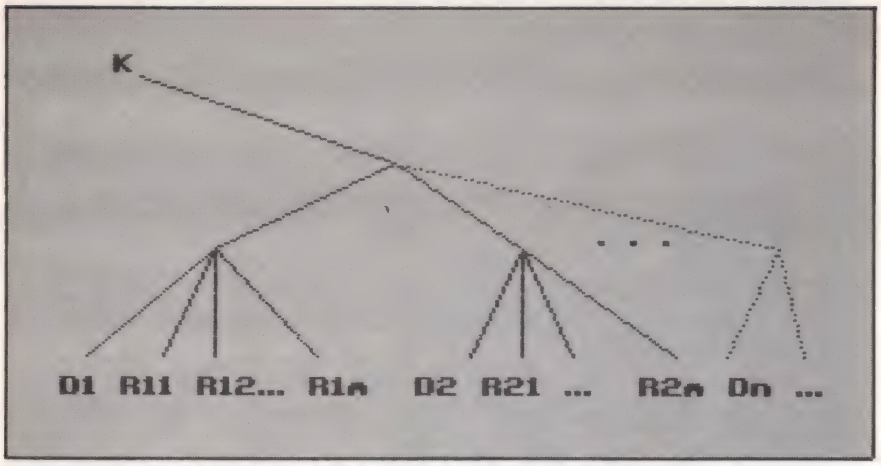
Examining the replies in a little more detail, it is obvious that the psychiatrist has connected the word *kitchen* either as a room in the *house* or with the theory of *cooking*. Bearing this concept in mind, the replies given are very non-



•Figure 1. Do not make a hash of it, Eliza — the hash algorithm in this script structure converts first letters of keywords onto integers.

```
(ARE 0
( ( 0 ARE I 0 )
  (WHY ARE YOU INTERESTED WHETHER I AM 4 OR NOT)
  (WOULD YOU PREFER IF I WEREN'T 4)
  (PERHAPS I AM 4 IN YOUR FANTASIES)
  (DO YOU SOMETIMES THINK I AM 4) )
( ( 0 ARE 0 )
  (DO YOU THINK THEY MIGHT NOT BE 3)
  (WOULD YOU LIKE IT IF THEY WERE NOT 3)
  (WHAT IF THEY WERE NOT 3)
  (POSSIBLY THEY ARE 3) ) )
```

•Figure 2. Take a seat, Eliza — a section from the Doctor version of the Eliza program in the MAD-SLIP list structure.



• Figure 3. Climb these branches, Eliza — a tree diagram to represent the keyword and rule list structure of the Eliza program.

committal, requiring no further knowledge of the subject.

The first process which needs to be carried-out by the conversational program we are to develop is substitution. By substituting a few of the words in the original sentence, seemingly intelligent replies can be formed. Weizenbaum likens the process to that of a foreigner with a limited knowledge of English. Suppose the foreigner heard the sentence: "I have my own car now."

With no knowledge of the subject area, or even of what the speaker may be talking, simple substitution rules are sufficient to continue the conversation with the sentence:
"You have your own car now". The speaker might continue with: "I bought it last thursday". To which the foreigner would reply: "You bought it last thursday" and so on.

Though perfectly correct English, that kind of conversation would soon become boring. The problem is that although the foreigner is constructing legitimate replies, the sentence appears exactly the same as the input. The trick is to transform the sentence into something which appears different.

Priority

Figure two shows a section of the script from the Doctor version of the Eliza program. It is given in the MAD-SLIP list structure which is very similar to Lisp. The first item in the list is the keyword *Are*. It is followed by the priority of the keyword, in this case zero. When the computer is trying to compose its reply, it scans the entire input sentence for the keyword which is in the script. If it finds more than one, it considers the one with the highest priority.

The rest of the structure contains lists containing a Decomposition rule followed by one or more Reassembly rules. In the first case, the decomposition rule is '(O ARE I O)'. The Os match any number of words. Remember that word substitution will already have taken place, so this decomposition rule would match the sentence Are you making fun of me which would have been substituted into Are I making fun of you.

Having matched the decomposition rule to the sentence, the input sentence is literally decomposed into the relevant sections. In this case, bearing in mind that the 'O' represents "any number of words", there are four sections to the sentence. They are:

1. "" (Nothing)
2. "ARE"
3. "I"
4. "MAKING FUN OF YOU"

Having decomposed the sentence successfully, it is necessary to re-assemble it using the re-assembly rule. If there is more than one reassembly rule for a given decomposition rule, the system cycles through the reassembly rules using the next one each time the decomposition rule is matched. That adds variety to the replies by the computer, even when the input is very similar. If we consider the first reassembly rule, which looks like Why are you interested in whether I am 4 or not.

The '4' means that the fourth section of the decomposed sentence should be inserted, so the final answer would be:

Why are you interested in whether I am making fun of you or not.

The next reassembly rule would give the answer:

Would you prefer if I weren't making fun of you, followed by: Perhaps I am making fun of you in your fantasies and, finally:

Do you sometimes think I am making fun of you.

If the decomposition rule for the keyword 'ARE' does not match the sentence, the system tries the next decomposition rule, which should be either very different or more general. All the rules are tested in order, so there would be no point in having the rule '(O ARE O)' followed by '(O ARE I O)', because the first rule is bound to match sentences of the type which match the second rule. Consequently, the second decomposition rule and its associated reassembly rules would never be used.

Reassembly

The keyword and rule list structure of the Eliza program can be represented by the tree diagram in figure three. The top level of the structure contains the keyword. It is followed by a set of lists, each of which contains one decomposition rule followed by any number of reassembly rules. This type of structure imposes no bounds, other than that of memory, on the number of keywords which may be included, the number of decomposition rules per keyword, or the number of reassembly rules per decomposition.

In the original MAD-SLIP DOCTOR program the script contained 50 keywords. For speed, the keywords were randomised — hashed — to produce a seven-bit integer which determined the place of the keyword in the list.

Hashing is a means of finding unordered data quickly by applying a function to the input. For instance, in the original program, hashing the keyword 'ALWAYS' produced the integer '14'. The list structure for this keyword was then placed at this point in the keyword dictionary. When the input sentence is being scanned, rather than having to search the entire dictionary of keywords for each word in the input sentence, each word is hashed and only the small part of the dictionary which produces that hash result need be searched.

Majority

On the whole, it is rare to find a home computer with a built-in list structure. Therefore the majority of Eliza-type programs written for micros are either in a language such as Lisp, or search through a list of DATA statemennts containing the script, this being the list of keywords, decomposition rules and reassembly rules.

We could easily write our program in Lisp but it would make it more difficult for many people to understand and it would make it impossible for the majority of people to make any changes to it, as they are unlikely to have the Lisp language. Therefore it is more sensible to

write the program using SuperBasic. That takes us to the problem of speed. One of the big advantages of the QL is that of memory — there is plenty of it. That means we can easily compose large scripts but if we search DATA statements for keywords there is likely to be a long delay before the computer replies to the user input sentence.

Further, most programs of this form do not have the flexibility of the original program which was able to match alternate words to a sentence, cross-reference between keywords and so on. It is possible to include all this as but it will slow the program operation still further.

The solution is to set up a list structure directly in memory and operate on it. The easiest way to do this is to have a separate program which reads a script from DATA statements and organises the list into an area of the RESident PRocedure (RESPR) memory. This list structure can then be saved using LBYTES and used by a second application program which loads it using SBYTES.

Not only does that give the flexibility of the original list structure but it allows us to hash the keywords for speed. Further, changes to the script can be made very easily by changing DATA statements in the list-formation SuperBasic program.

Rather than prolific use of brackets to form the lists in the DATA statements, a more obvious format has been adopted. It can be seen by the small section of script shown in figure four. Each keyword structure should start with an asterisk * followed by the keyword. The next item should be the priority of the keyword. The higher the number, the higher the priority, with the highest keyword being used when more than one occurs in the sentence.

```
*WAS , 2
  + @ WAS YOU @
    /WHAT IF YOU WERE @4 ?
    /DO YOU THINK YOU WERE @4 ?
    /WERE YOU @4 ?
    /WHAT WOULD IT MEAN IF YOU WERE @4 ?
    /WHAT DOES ' @4 ' SUGGEST TO YOU ?
  + @ YOU WAS @
    /WERE YOU REALLY?
    /WHY DO YOU TELL ME YOU ARE @4 NOW?
    /PERHAPS I ALREADY KNEW YOU WERE @4
  + @ WAS I @
    /WOULD YOU LIKE TO BELIEVE I WAS @4 ?
    /WHAT SUGGESTS THAT I WAS @4 ?
    /WHAT DO YOU THINK?
    /PERHAPS I WAS @4 ?
    /WHAT IF I HAD BEEN @4 ?
```

• Figure 4. Do it this way, Eliza — small section of script to show the more obvious format adopted instead of copying with prolific use of brackets.

Flexibility

The priority integer can be followed by either a single equivalence rule or by a decomposition rule and a number of reassembly rules.

If you use an equivalence rule you should include the equals sign '=' followed by the keyword you are equivalencing. That ends the particular keyword structure. The equivalenced keyword should already have appeared in the script or an error message will be generated. When the computer encounters this format it will use the equivalenced keyword to decompose the sentence, assuming this has the highest priority. In this way, a number of keywords can share the same set of decomposition and reassembly rules, saving space and adding more flexibility to the system.

The alternative to the equivalence rule is the decomposition rule, which should start with the plus symbol '+'. A typical example of a decomposition rule might be:

+ @ I ARE @

where the '@' symbol represents "any number of words". Remembering that the 'I' has been substituted from 'YOU', this would match input sentences such as:

I think you are stupid

which would be decomposed into the four sections:

1. "YOU THINK"
2. "I"
3. "ARE"
4. "STUPID"

In addition to the '@' symbol, the hash '#" may be used to substitute for exactly one word.

Another feature which may be included in the decomposition rule is optional matching. In this case, optional matching words are enclosed in brackets. So, for instance, the decomposition rule:

+ @ YOU (WANT NEED) @

would match a sentence such as:

I want a new computer

or:

I need a new computer

just as easily.

Following the decomposition rule, you should include one or more reassembly rules. They start with the slash symbol '/'. If you want to substitute sections of the original sentence into the final output, you can refer to a section using '@N' where 'N' is the number of the decomposed section. For example, if part of the data was:

*REMEMBER,5
+ @YOU REMEMBER @
/DO YOU OFTEN THINK OF @4?

and the input sentence was:

I REMEMBER MY YOUNGER DAYS

this would be decomposed into the four sections:

1. "" (Nothing)
2. "YOU"
3. "REMEMBER"
4. "YOUR YOUNGER DAYS"

which would be reassembled as:

DO YOU OFTEN THINK OF YOUR YOUNGER DAYS?

Remember that you may have as many reassembly rules as you like for each keyword. The program will cycle through them all before repeating itself, thus adding more variety to the replies.

The reassembly rule sequence is terminated either by a rule starting with a '+' — new decomposition rule for the current keyword — a '*' new keyword, or a pound sign '£' — end of script.

For anybody wishing to follow or alter the program, this script is poked into memory using the structure shown in figure one. The hash algorithm converts the first letter of the keyword into an integer in the range 0 to 25. This is by no means the most elaborate hash algorithm but unless you have extremely large scripts it will never have to search more than about five keywords to determine whether the input sentence word appears. That is far faster than searching through hundreds of lines of DATA statements, as is normally the case with these programs.

As you can probably imagine, with a reasonable script the final program is far too large to print in the magazine but it is available through Microdrive Exchange. The cartridge includes PSYCHO1 which forms the script from DATA statements, SCRIPT containing a variation of the original Doctor script with more than 50 keywords, and PSYCHO2 which operates on the SCRIPT list data and interfaces with the user.

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BETTER BASIC

Mike Lloyd looks at the importance of menu design for user-friendly programs.

Menu design is an important part of computer ergonomics. Many computer programs contain menus and some are completely menu-driven. The friendliness of such programs depends partly how menus are displayed and organised and the way in which the user indicates choices. The bundled QL Psion programs include a surprisingly wide variety of menus, good and bad, and because most QL users will be familiar with them they will be used as examples.

A menu is traditonally a fixed choice of alternatives but, as computer programs have become more intelligent, menus have allowed a wider range of responses. Any series of requests for information from the user is a form of menu.

Menus present programmers with three basic problems to solve — how to structure menu options; how best to present options on the screen; how to detect the user's choice.

Menus can be structured in three ways — as a series of options presented one after another; as a list of options presented together; or as a series of menus and sub-menus. These structures can be described respectively as sequential, concurrent and hierarchical.

Sequential menus present options in a strict order. An example of this methos is provided by the Quill *HEADER* command. The user is guided through a series of decisions concerning the position of the header, text, vertical separation from the main text and typeface option in the order determined by the programmer.

Concurrent menus allow the user to make selections in any order from a number of options. For instance, the Quill *DESIGN* command presents a sub-menu of seven options, any of which can be selected by pressing the appropriate initial letter.

Finally, hierarchical menus, or menu trees, arrange options into groups and sub-groups. The general format of all of the Psion programs except Archive is hierarchical. The topmost Quill menu gives access to three main sub-menus, the help facility, the command menus and the typeface menu.

It is possible to go further into the hierarchy by, for instance, pressing F3 to enter the command sub-menu, pressing "O" to obtain the alternate list of commands, pressing "F" to access the file operations sub-menu, and then pressing "B" to begin a sequential menu to back-up a file.

The presentation of menu options on-screen depends to a large extent on the structure of the menu and the method used to select options. Choices could be shown in a dedicated area of the screen, such as the Psion control area at the top of the screen. Alternatively, the screen could be cleared to present only menu options, as happens with the Design sub-menu. Another method is to use transient windows which over-write part of the screen temporarily. Options could be explained in words or by icons.

One problem facing software designers is how much on-screen explanation to give users. A large amount of information is useful when users are new to a package but too much hand-holding becomes tedious once people are familiar with the options. Psion uses four levels of user-friendliness. The command line at the bottom of the screen gives very brief prompts, the upper control area provides more detailed information and pressing F1 obtains even more information from the *help* file. If all of that on-screen assistance is not sufficient there is always the manual.

Programmers are faced with a wide variety of solutions to the problem of how to register the user's choices. The ideals to aim for are a minimum of keypresses, consistency throughout the program, clear relationships between keypresses and the options they represent, and the avoidance of potentially-fatal accidental keypresses.

One of the most straightforward methods of seeking information from the keyboard is to use the INPUT command but for single keypresses it is tiresome to have to follow each choice with an ENTER keypress. Nevertheless, for multiple-character input the INPUT command, suitably trapped to prevent accidental errors, is useful.

Where options can be selected by a single keypress, either the KEYROW or the INKEY$ command can be used. KEYROW is fast and ideal for detecting cursor or function key input because those key groups share one KEYROW parameter. INKEY$ is slower at detecting keypresses but is easier to use for alphabetical or numerical input.

Menu options could be numbered or associated with a function key. That is an easy way to produce single-key entry but there are some disadvantages. Using the function keys limits the number of options in a menu to five and using the digit keys limits menus to 10 items. Both key sets could be extended by adding CTRL, SHIFT and ALT keypresses but using a limited number of keys for a wide variety of purposes can be confusing.

An alternative is to use mnemonics, usually the initial capital of each option. It becomes complicated when options share the same initial. In Quill, for example, P can mean Page, Print or Paint. That conflict about initials explains the choice of E for Erase in Quill but R for Rubout in Abacus; in Abacus E represents Echo.

Programmers must also consider how familiar users will be with the keyboard. A word processing program can be written assuming

KEYWORD OF THE MONTH

Early Basics ran on computers with little memory and so the luxuries of a fully-structured language had to be foregone. The keywords GOTO and GOSUB were therefore developed to re-direct program flow. Their simplicity saved memory space but they have caused heated arguments about the merits of structured programming.

GOTO directs the program flow to the line number represented by the expression, usually a single number, which follows it. The expression does not have to be an integer, as fractions are rounded-down automatically. Neither does the parameter have to equate to a line which exists — interpreting will begin at the given line or the one immediately following.

GOTO is encountered most often in an IF statement, so that one set of actions is carried-out if an expression is true and another if it is false. For example:

```
100 LET X = RTND (100)
110 IF X > 99 THEN GOTO 800
120 PRINT X
130 GOTO 100
800 STOP
```

GOTO and IF statements can be used to improvise REPeat loops, FOR...NEXT loops and even GOSUB statements. They provide sufficient structure to write all but the most complex programs. More sophisticated constructs are easier to use, make listings easier to understand and make programs run faster, which is why computer language designers have bothered to develop them.

One development of the GOTO concept is GOSUB, which stands for *GOto SUBroutine*. Whereas GOTO causes a permanent change of program flow, GOSUB allows a programmer to return to the statement which follows the GOSUB command and to continue with the original program flow. The subroutine must end with a RETurn command, as in this example:

```
200 LET X 7*25: GOSUB 500
210 LET X = X+17: GOSUB 500
2210 LET X = X-52: GOSUB 500
500 PRINT X
510 RETurn
```

GOTO and GOSUB are such essential features of so many Basic dialects that it is unsettling to be told that they are obsolescent in SuperBasic, yet the more powerful structures of SuperBasic make them redundant.

Purists claim that to use GOTO or GOSUB is inelegant, while others claim to be unable to recognise either elegant code or its advantages to the programmer. The argument is almost entirely irrelevant to software users because it is impossible to tell the quality of a program structure when it is running. Structures are there to assist the programmer and it is a matter of individual taste whether or not to use them to the full.

There are occasions when programmers should submit to the disciplines of structured programming. One example is writing software for the benefit of other programmers. That is why *Better Basic* routines almost invariably avoid GOTOs and GOSUB' and why readers complain when *The Progs* includes unstructured programs. GOTOs and GOSUBs tend to make program listings impenetrable and tedious to debug or amend.

Sometimes, but very rarely, a GOTO or GOSUB will be preferable to a procedure call. Most GOTO jumps are completed faster than procedure calls and procedures which do not include parameters might be executed more speedily if re-written as GOSUBs. Another use for GOTO is to skip bits of untested code when developing programs. GOTO and GOSUB should never be used to force the program flow out of a procedure or function definition.

The debate on structured Basic will end not when GOTO and GOSUB are removed from the language but when Basic dialects finally rid themselves of line numbers. Nevertheless, SuperBasic is an important step in the direction of efficient structured programs.

that its users can type but a child's educational program might have to structure its menu round the function keys or the number keys rather than use mnemonics.

An alternative to character input is to use a cursor bar which can move over options under cursor-key control, with selections being made by pressing the ENTER key. This method is well-suited to mouse-controlled software. Another favourite with mice is the use of graphic symbols called icons but some supposedly user-friendly menu systems use unintelligible and confusing icons arranged in a complex hierarchy of sub-menus which are so time-consuming to use that it would be easier to type-in control words instead.

There are some general principles by which menus can be judged. Consistency is important, particularly in suites of programs, so that users learn a coherent menu system. Ideally, the cursor, ESC, TAB, SPACE and ENTER keys should have the same function throughout a program. Flexibility can be encouraged by giving users a variety of ways of indicating an option.

For instance, both ESC and Q could represent "Quit" and both Y and ENTER could mean "Yes" but it is always a bad idea to let all keys other than Y indicate No, for example, because an accidental keypress could have unforeseen and possibly fatal results. There are sufficient opportunities to make disastrous errors without programmers adding to the confusion by carelessness.

Programmers should decide early in the design of a program what functions to ascribe to keys such as ESC and ENTER. For instance, ESC might take the user to the top level of a hierarchical menu or merely to the level above the current one. Once that choice is made there should be no exceptions to the rule.

The quest for single-key mnemonics should not lead to a profusion of short sub-menus, each using a handful of initials for different purposes. Two key mnemonics, such as those used by the Digital Precision *Editor*, are an acceptable compromise between ease of use and a wide choice.

Menu hierarchies should be logical and should not prevent legitimate options being chosen. Some people use a number of printer drivers with Quill and the logical place for them to be selected is immediately before printing a document. Unfortunately, the printer driver must be selected prior to loading Quill. A better example is provided by the *Paint* mode — different typeface combinations can be selected by single keypresses and changed at will.

• *Next month's feature will include listings for menu systems.*

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9 QL Time VI

Leslie Fahidy calls time on a clockface demonstration program

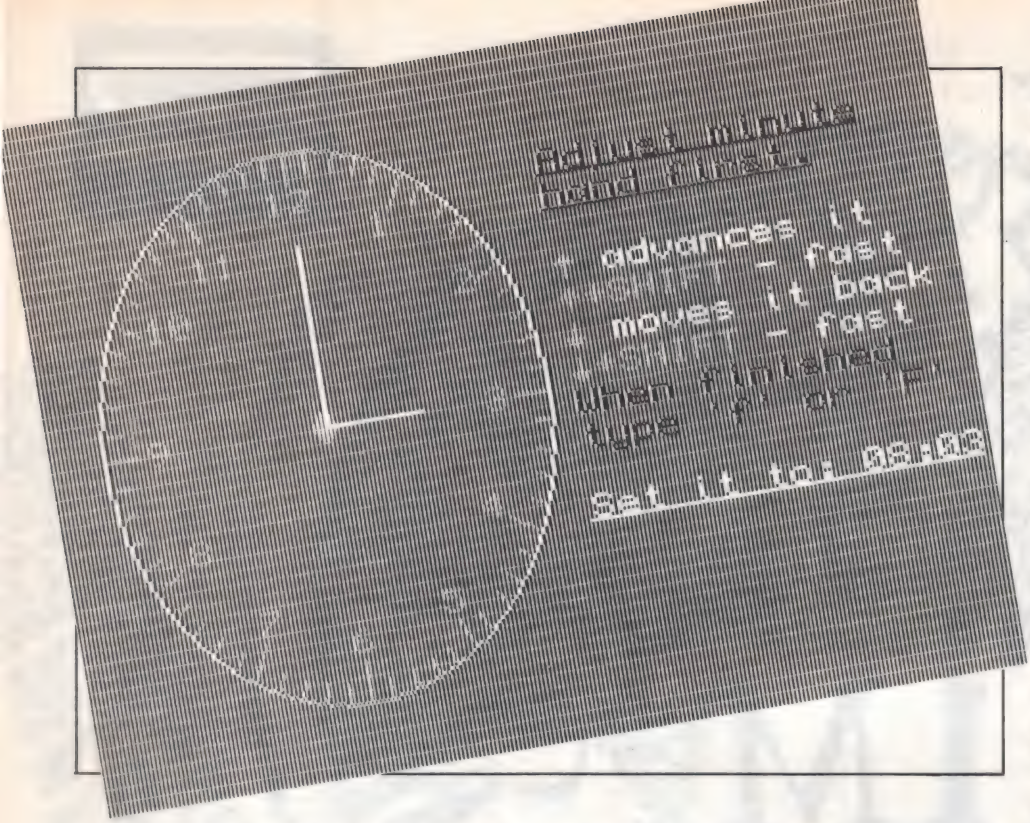
Some aspects of teaching the clock were given last month and I promised a full listing. Since the listing of the whole program amounts to eight pages of single-spaced A4 print, the editor and I agreed that it was not reasonable to publish it all. It would not be much fun for you to type it in. So, this month, apart from discussing some of the points of the finished program, I will give the listing of a demonstration program. The program will draw the clockface and ask the user for a choice of whether he wants to read the clock or set it.

The demonstration program will enable me to say a few words about turtle graphics, since the program operates largely using the code of turtle graphics, and the full program will be available from Microdrive Exchange.

While on the subject of making plans, I feel that I should also tell you that this article concludes the current series. In future months it will take a different form — we shall publish a series of educational programs in Microdrive Exchange. No attempt will be made in the programs to teach the reader how to write such programs, even though it is possible to acquire the correct technique by listing the programs and observing how the goals were achieved. All the programs will be written in Super-Basic, so you will have a chance of modifying them to your special needs.

I now refer to the program which is listed in this issue. Apart from a few REMarks, starting at line 100, the main body begins in line 1000. I should probably tell you that this is not by accident. I like to start programming at line 1000; it gives a more readable listing. You may have observed already that I like to use indentations in a listing and I consider them very important. If I started at, say, line 100 in steps of 10, any program of reasonable length would go well beyond line 1000. The point where it jumps from 990 to 1000 would play havoc with the indentations and, in my experience, it always occurs in the middle of a FOR.....END FOR loop.

Lines 1000 to 1100 set up the screen with yellow background and ask for the user's choice. I have been running the program on a QL with a TV set and it



gave pleasing results but if you use a monitor the best choice of colours may be different.

After the user has entered a choice, line 1110 calls the procedure 'uppercase'. The purpose is to convert the user input to upper-case characters. I use many versions of Basic and SuperBasic is one of my favourites but one of its omissions is that it does not provide the user with the 'UPPER$' function, so I had to write the procedure. Note that 'uppercase' is called with the parameter 'mixed$'. The name is, of course, unimportant but it is very useful to be able to call a procedure or function with a named parameter.

Prompt response

The procedure runs from line 1470 to 1560 and its use is necessary because we do not know whether the user types upper- or lower-case characters in response to the prompt. In any case, we do not want to limit him to either of those cases; 'uppercase' will convert the input to capital letters. On the face of it, this seems to be a simple task; the code of any capital letter is 32 less than the code for the same lower-case letter but it would not do to subtract 32 from the code of each letter.

For instance, what would happen if the user entered a capital letter and the program subtracted 32 from its code? A reading of the listing should convince you that the program would, if the user chose to set the clock, give him the chance of reading it. A program which crashes or, even worse, carries-out the wrong type of action, is never to be accepted but it is particularly important to observe this code of conduct when writing educational programs. Our aim must be to teach and enlighten, not to confuse the learner.

The main body of the demonstration program, starting in line 1130, is the procedure to draw the clockface. First, it defines the co-ordinates of the centre of the circle at X=Y=50 and the radius as 40 units and proceeds to draw the circle. Apart from those three parameters, it also defines some variables, called 'back', 'big_notch' and 'small_notch'. The names you choose are not of real importance but it is a good idea to choose meaningful names which will remind you later of the meaning of the variable.

The variable 'back' is needed to enable the program to move the turtle back to the centre of the circle, from its perimeter, without drawing a line and without having to specify each time the number of units — 40, in this case. As a general principle, constants should be held in variables, rather than typed-in as literals every time they are needed. In the current program, if I wanted to change the radius, and the value of 'back', I would have to alter line 1140 only, rather than to find and change every single occurrence of that value.

The other two variables defined in line 1160, the 'notches', refer to the lines we draw at one- and five-minute intervals on the perimeter of the clock. At the five-minute intervals we need to draw a slightly longer line.

The REPEAT....END REPEAT loop, in lines 1200 to 1290, draws those lines on the clock-face. The evaluation, of whether to draw a 'big_notch' or a small one is done in line 1220.

Having drawn all the lines of division, the next task is to produce the numbers in the proper places. In SuperBasic there are two methods of printing at a particular point on the screen and both methods are used in this section of the program.

The 'at line, column' command is preferable, because it is easier to use but it does not give fine control of the positioning of the characters. Much more accurate control may be achieved through the use of the 'cursor x,y' command but it takes a fair amount of working-out the values. Even then, I find it is necessary to try it before finalising the command.

The procedures 'read_it' and 'set' have been included in the listing, to make sure that the program does not crash when the user makes a choice. They are replaced by two different procedures in the final program. Apart from preventing a program crash, which could have been achieved by other methods, I have included these skeleton procedures to show you a useful technique.

When you build your program from a series of previously-written procedures, functions and subroutines — called the 'top-down' method — it happens inevitably that the main program cannot call one or other of them if it is not yet available or not yet part of the listing. In such situations, it is a frequently-used and attractive proposition to replace it with a skeleton procedure, function, and so on, to enable you to try other aspects of the program.

Complete program

The complete program contains a number of procedures which might be worth examination. You do not need to know any of this to run the program but if you wish to know how it works, or perhaps you want to include some modifications of your own, here is an explanation of some of its salient features. To give you a guided tour of some features of the complete program, I shall deal separately with the procedure to set the clock and the one to read it.

Let us start with the procedure 'set'. Once the user has chosen this option, the clock is displayed, together with a message to say that the minute hand should be adjusted first and instructions are printed on how to set it. Nothing further happens until the learner presses either the up or the down arrow key, with or without shift — unless a keyboard interrupt is forced by pressing CTRL and space. The code of the key pressed is detected and the minute hand will either be advanced or retarded, one minute at a time for an arrow key and five minutes for each press if the shift key is also used.

The hands disappear momentarily and they appear re-drawn in the new position. The process is continued until

the user presses 'f' or 'F' to terminate it. No evaluation is given at this stage — only after both hands have been set. it is open to argument whether or not the setting of the minute hand should be evaluated before setting the hour hand. If you decide that it should, particularly for young and inexperienced users a careful reading through the listing will suggest the necessary modifications.

The hour hand is adjusted in the same manner; this time the arrow keys advance and retard the hand by a fraction of an hour; together with the shift key they change the current setting by one hour.

Time-sensitive

When the process of setting is completed, the program compares the required time with the time set by the user, allowing a small tolerance in the position of the hour hand, and prints the evaluation with an encouraging message, if the setting is correct. Some further tolerances are allowed. If the setting of the minute hand is only marginally wrong, by not more than two minutes either way, the message on the screen will indicate that. From an educational point of view, we must treat a totally incorrect answer in a manner different from one which is slightly inaccurate. Further, if either the hour or the minute hand is set correctly — only the setting of the other hand is incorrect — the message will again say so. An extra facility which is not part of the complete program but could, usefully, be added, is to keep a record of each process of setting, noting whether the hour or the minute hand was set incorrectly, and how often, and when the program is terminated such a message could be displayed, partly for the benefit of the learner and partly for that of the teacher.

From a programming point of view, this procedure presents a more challenging task. I mentioned in last month's article that the program must allow for various methods of entering the time. Obviously we must draw a line somewhere and it is possible to think of a method of entry which would not be accepted but the program accepts any of the following methods:

Using the words 'to' or 'past' the hour, in such a way that the words "o'clock" and 'minute' may be either present or absent.

'Quarter' or 'half' to or past the hour.

The number of hours and minutes separated by any one of the separators . , ; : .

The exact hour position with the word "o'clock" appearing in the input.

In procedure read_it, once the input from the user has been obtained it is first separated into one of its possible forms. If the input is 'X' or 'x', the program terminates the REPEAT loop; this input signifies that the user does not wish to have more practice at this stage. If the input contains alphanumeric characters, it is directed to procedure 'alpha' for evaluation. An input containing any of the permitted separator characters is sent to procedure 'separate' for further evaluation. Finally, if the word 'clock' appears in the input, it will be directed to procedure 'o_clock'.

In all cases, the time is converted to a format which is meaningful to the program and it is that value which is compared to the original time, determined by the computer and held in the variables hour$ and minute$. The evaluation of the answer is more stringent than it is in the case of the 'set' procedure; in fact, the answer must be correct. That is reasonable, since a clock may be read with a higher degree of precision than the process of setting it.

```
100 REMark ***************************
110 REMark **Demonstration Program.**
120 REMark ****To draw clock-face****
130 REMark *******Leslie Fahidy******
140 REMark ****QL Education Series***
150 REMark ***************************
1000 PAPER 6:INK 1:CLS:clock_face:RANDOMISE:CLS#0
1010 INK 0
1020 AT 3,21:PRINT"Do you want to:"
1030 AT 5,21:FLASH 1:PRINT"<S>";:FLASH 0:PRINT"et the clock"
1040 AT 6,26:PRINT"or"
1050 AT 7,21:FLASH 1:PRINT"<R>";:FLASH 0:PRINT"ead it?"
1060 AT 10,21:PRINT"Your choice?"
1070 REPeat loop
1080  a$=INKEY$
1090  IF a$="R" OR a$="r" OR a$="S" OR a$="s" THEN
      EXIT loop
1100 END REPeat loop
1110 mixed$=a$:uppercase mixed$
1120 IF upper$="R" THEN read_it:ELSE set
1130 DEFine PROCedure clock_face
1140 x=50:y=50:radius=40
1150 back=-radius
1160 big_notch=6:small_notch=3
1170 CIRCLE x,y,radius
1180 angle=90:PENUP
1190 INK 2
1200 REPeat loop
1210  TURNTO angle
1220  IF angle/30=INT(angle/30) THEN MOVE radius-big_notch:
      ELSE MOVE radius-small_notch
1230  PENDOWN
1240  IF angle/30=INT(angle/30) THEN MOVE big_notch:
      ELSE MOVE small_notch
1250  PENUP
1260  MOVE back
1270 angle=angle-6
1280 IF angle=-270 THEN EXIT loop
1290 END REPeat loop
1300 AT 3,10:PRINT"12"
1310 AT 4,14:PRINT"1":AT 6,17:PRINT"2"
1320 CURSOR 210,95:PRINT"3":CURSOR 200,125:PRINT"4"
1330 CURSOR 174,150:PRINT"5":CURSOR 128,157:PRINT"6"
1340 CURSOR 87,148:PRINT"7":CURSOR 59,125:PRINT"8":CURSOR 47,95:
     PRINT"9"
1350 CURSOR 55,60:PRINT"10":CURSOR 80,45:PRINT"11"
1360 FILL 1:CIRCLE 50,50,2:FILL 0
1370 END DEFine
1380 DEFine PROCedure read_it
1390 CLS:RANDOMISE
1400 hours=RND(0 TO 12)
1410 minutes=RND(0 TO 59)
1420 AT 1,15:CSIZE 1,1:PRINT hours;":";minutes:CSIZE 0,0
1430 AT 10,1:PRINT"This is the ";"random time selected."
1440 END DEFine
1450 REMark convert to upper case
1460 REMark input=mixed$,  output=upper$
1470 DEFine PROCedure uppercase(mixed$)
1480 LOCal loop,new_code
1490 IF mixed$="" THEN EXIT uppercase
1500 upper$=""
1510 FOR loop=1 TO LEN(mixed$)
1520  new_code=CODE(mixed$(loop TO loop))
1530  IF new_code>96 AND new_code<123 THEN LET new_code=
      new_code-32
1540  upper$=upper$ & CHR$(new_code)
1550 END FOR loop
1560 END DEFine
1570 DEFine PROCedure set
1580 read_it
1590 END DEFine
```

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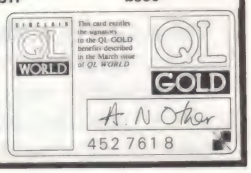

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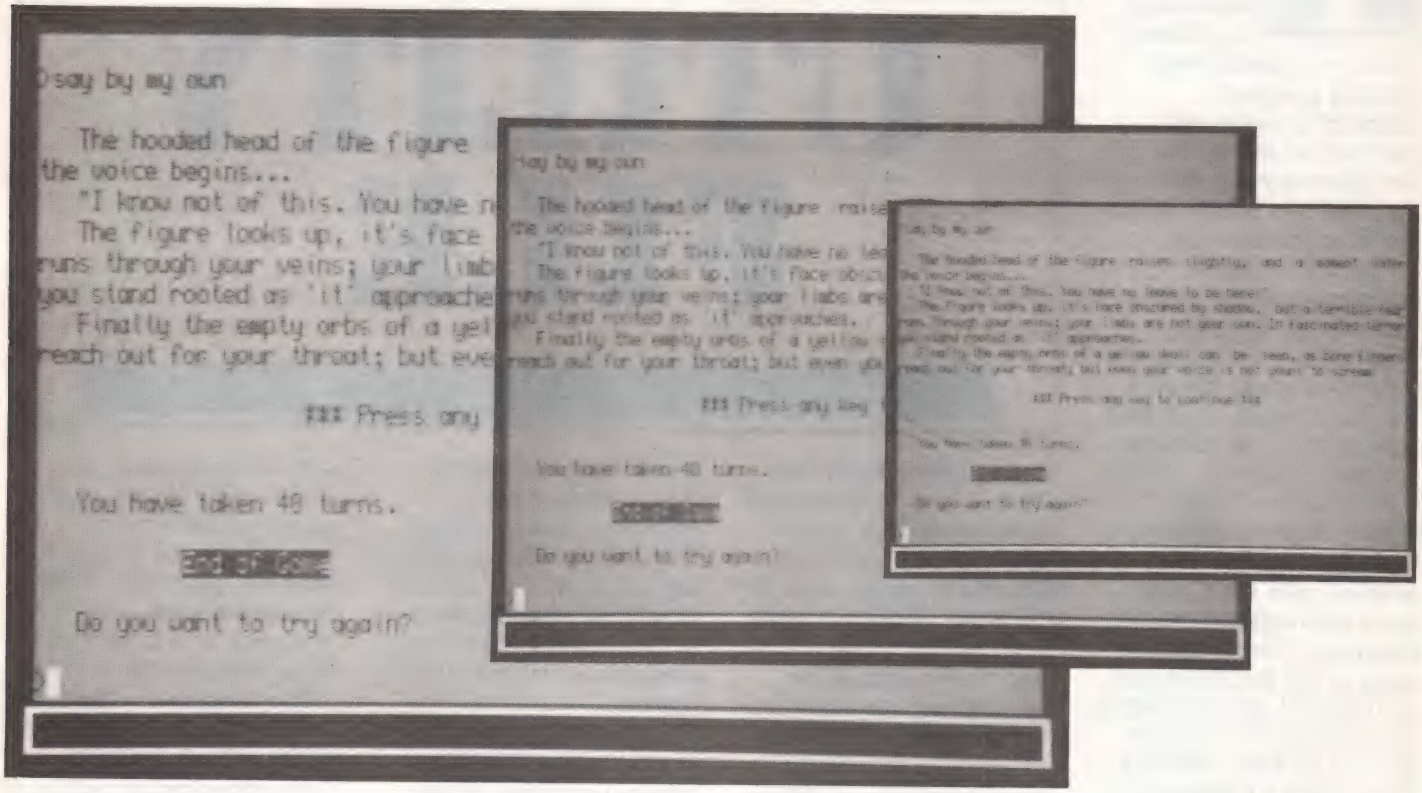
Charles Gerrard wanders into the mythical world of Gern, a powerful evil spirit in wolf's clothing



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When Gilsoft released its Quill Adventure Writing System for the QL, *Sinclair QL World* predicted, or at least hoped, that it would provide the vehicle for many new QL text adventures. *The Heart Of Gern* from PCBS is the first of such games written with the aid of Quill. If those which follow it maintain an equally high standard, QL adventurers will have much to anticipate.

The scenario will be familiar to those well acquainted with the adventure genre. The mythical Princelands are the scene of a battle between the forces of good and evil. On the right side is our hero and the main character in the game, Tirac, played by you. The baddies in the plot are the Brotherhood, religious followers of the wolf-god Fenris.

The major pre-occupation of the Brotherhood is to recover the Heart Of Gern. Gern is, or was, a spirit wolf, a powerful evil spirit inhabiting the body of a large wolf. He is supposed to be dead but his spirit was saved by Yandross, a particularly evil and clever member of the Brotherhood.

Yandross trapped Gern's spirit in a spherical black jewel, the Heart Of Gern, and hid it in a secret vault; now the Brotherhood is on the way to thaw him out. Having a spirit wolf on the loose is not a prospect Tirac *et al* view with much relish. The only solution is to reach the vault first and swipe The Heart from under the nose of the Brotherhood.

Fortunately the Brotherhood has no monopoly on religious mysticism and magical powers. Tirac is a follower of the Church Of Light. Membership entitles him to a free sundisc which shines in the dark and recourse to psuedo-religious exclamations such as 'sun in heaven!' and 'name of the day!'.

Tirac's quest begins at the entrance to the secret vault. Its whereabouts has been revealed to him by Besac, whose search for The Heart was concluded prematurely when he was attacked by a pack of great wolves. You can learn this and other details from the accompanying literature, which includes an illustrated introduction to the story.

Once inside the vault you are on your own. The usual rules of adventure gaming apply. It pays to look round and examine as much as you can before making your move. The most helpful advice is to use your grey matter. There is always some small clue which will give you the key to overcoming specific problems.

A pleasant feature of the game is that, unlike far too many adventures, you will not find yourself in a useless dead-end having played for several hours and overcome countless virtually impassable obstacles. Gern is more than a maze; the challenge is to overcome each tricky situation as it arises. If you really cannot work it out, PCBS will provide a few useful clues but cheating in that fashion must be a last resort. Finally, if you buy the game and I recommend it, if you find how to get past the hooded guard I would appreciate a line.

Talent scores with CAD plotting packages

This month's instalment of Utility File details the Talent classic two-dimensional drawing program, *TechniQL*, along with practical considerations of the Talent support system, *TechniKit*, as used with the Penman plotter.

The first definitive technical drawing program available for the QL, TechniQL was released as a result of popular demand for a technically-orientated version of its popular sister product, *GraphiQL*. A true CAD package, TechniQL is somewhat more specialised, and inherently more flexible, than many of the more conventional drawing programs. Users requiring some of the features found in TechniQL generally have a more formal concept of the end drawing, whether for use with a flowchart, packaging design, technical plans or diagrams of any nature.

Making the transition from GraphiQL, a solely MODE 8 program, to TechniQL, usable in either mode, has been facilitated by adopting a similar user interface in the latter; commands may be input either by selecting them from one of five menus, available by pressing ‹F1› to ‹F5›, or by using a two-letter input code.

Once started, the TechniQL screen displays a range of information. The largest area, the viewing port, is the drawing area. Three windows to the right of the drawing area provide system information.

The upper of the windows displays the current drawing status — cursor X/Y position or, alternatively, the distance between a set point on screen and the current cursor position; INK colour, free memory, layer list and layers displayed; width of the screen, related effectively to the scale of the drawing; and the identification of the cell being edited.

Centrally, the second window displays information periodically concerning various objects in a cell. At the bottom of the information panel a third window displays instructions and system prompts.

The input of commands generally have two additional keys associated with them; pressing ‹SPACE› will accept the product of a command; pressing ‹ESC› will abort the command. Where a text input is expected, such as screen text or a drive access, inputting a null string — pressing ‹ENTER› without other, perhaps default, text being available — will abort this option.

The cursor can be moved in single steps or in units related to the size of the optional grid. If the grid-related movement is on ‹SNAP›, pressing ‹CTRL› and an arrow key will move the cursor in increments of three steps; ‹SHIFT› and an arrow key will move the cursor eight steps. If the SNAP option is off, using an arrow key with ‹SHIFT› and ‹CTRL› will move the cursor in 32 and eight pixel steps respectively.

Alternatively, the current cursor position can be marked, moved to a new location, additional drawing can be done, and 'Jumped' to its marked position, with the "CJ" (Cursor Jump) command. The cursor may be displayed in any of the colours available from the extensive palette. When selected, the grid is also displayed in the current cursor colour.

With the exception of arcs, drawing with TechniQL is done with rubber-banding. Rather than the conventional continuous drawing, as utilised by most graphics programs, line drawing occurs by steps after selecting the polygon option; alternatively, single lines can be drawn from the current position of the cursor to a new position on-screen.

Employing a form of scale command, TechniQL provides a system for making very large, detailed drawings, occupying more than the size of a single screen. Once work on any given area of the screen is completed, the cursor can be moved to a new location

Information

Product: TechniQL **Price:** £49.95
Product: TechniKit **Price:** £24.95
Source: Talent Computer Systems, Curran Building, 101 St. James Road, Glasgow G4 0NS. Tel: 041 552 2128.

Product: Penman Plotter **Price:** £249
Source: Penman Products Ltd, 8 Hazelwood Close, Dominion Way, Worthing, Sussex BN14 8NP. Tel: 0903 209081

Product: Serial printer lead, with 25-pin D connector. **Price:** £10.
Source: Transform Ltd, 24 West Oak, Beckenham, Kent BR3 2EZ. Tel: 01-658 6350.

Penman Plotter output from TechniQL.

and the 'PA' (Pan) command will move the work area so that the new cursor position is centred.

Theoretically, it is possible to have a drawing effectively 65,535 pixels wide. Zooming in or out of a given area, centred on the cursor position, permits the user access to either an overview or the fine details of a drawing.

Having the facility to draw in cells is a powerful feature. Once a cell is drawn, a transistor symbol for example, it can be planted in a circuit diagram and, where necessary, transformed in one of several orientations — normal, mirrored vertically, mirrored horizontally or rotated anticlockwise by 90 degrees. Cells can be nested to a depth of nine, providing a system for building complex combinations of similar symbols from basic elements.

Libraries of cells can be created by the user and may represent repetitive shapes or symbols, including fonts and icons, for use with virtually any specialist form of computer graphics. Those cells may be super-imposed upon each other and can be viewed collectively or singly.

Two other exceptional features are that the system does not utilise QL fonts for screen characters, enabling users to manipulate text in a drawing. An initial character font is included with the drawing package, which can be modified or added to.

Although new fonts can be created in TechniQL by using its ability to produce elements of a drawing within separate cells, *TechniFont*, part of the TechniKit utility, provides a more comprehensive facility for producing a wide range of fonts and symbols.

TechniQL arcs utilise Bezier curves, avoiding problems associated with the Qdos ARC facility. To draw an arc is a two-stage process; up to four points are first marked on-screen, using the 'CM' (Cursor Mark) command. The second command, 'CURVE', is selected from the ‹F5› menu and a curved line will be drawn between the first and last of the points defined, with the two intermediate points influencing the shape of the curve.

Although somewhat more long-winded than the SuperBasic equivalent, the TechniQL method of drawing arcs is more flexible and is also consistent with other advanced features in the package.

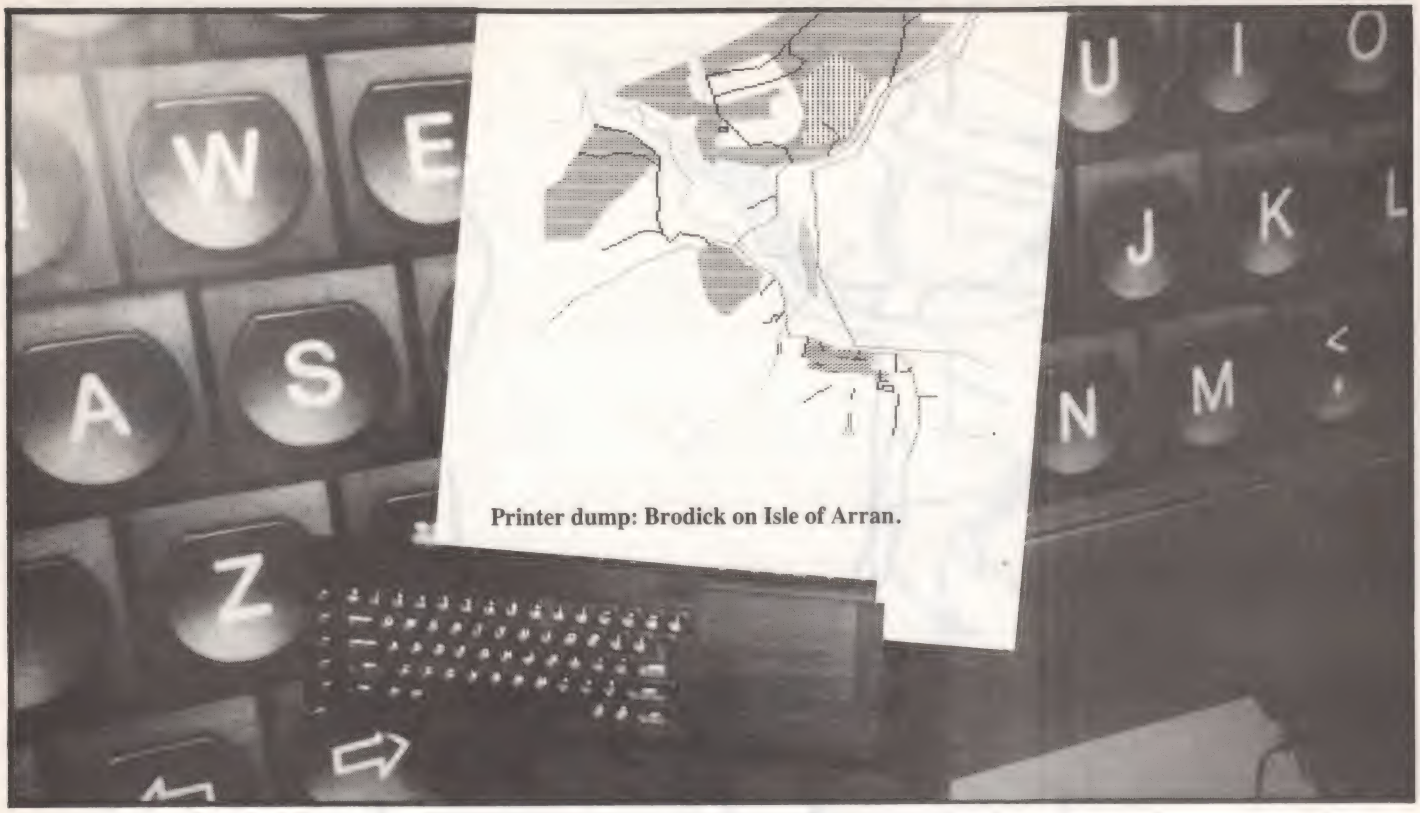
An important consideration is that the TechniQL drawing files are not conventional screen dumps and are very compact. The demonstration screen, the Isle of Arran, with its overlay of Brodick, takes 7.5K of file space.

The TechniQL screen dump for dot matrix printers is one of the most accurate available. Circles are represented as circles and show none of the eccentricity common in many graphic printer drivers. It does not differentiate between red and green.

TechniKit, is a powerful support program for TechniQL. Supplied as two separate main utilities, TechniFont provides a facility for producing groups of fonts or symbols; TechniPlot is a collection of three plotter driver programs — a driver for the Silver Reed Colour Pengraph; a general-purpose screen plotter, for adaptation to existing plotter driver programs; and a dedicated plotter driver for the Penman.

To use the Penman driver, the file Plotter must be deleted from the back-up cartridge and the file Penman copied to the same device, with the new name Plotter. Alternatively, if a toolkit supporting RENAME is available, the respective files can be changed appropriately.

TechniPlot loads two SuperBasic routines, used by the plotter driver, and a cut-down version of TechniQL which differs from the main drawing system mainly in that there are no facilities for making additions to a drawing;



Printer dump: Brodick on Isle of Arran.

other screen manipulation, such as drawing movement and scale alterations, can be made in the convention adopted by TechniQL.

When a drawing is loaded, it is drawn in the default screen width of 256 units. Entering 'ZO' (Zoom Out), decreases the size of the drawing one-and-a-half times for each entry. Zooming in is done by first positioning the cursor in the upper left or lower right corners, moving the cursor to the diagonally opposite corner and pressing ‹SPACE›. The screen will clear and be re-drawn at the new scale.

TechniPlot has an extensively modified 'PD' (Printer Dump) command. Rather than resulting in the standard line dump, used by dot matrix printers, 'PD' calls the SuperBasic subroutines loaded along with the modified TechniQL drawing handler. These translate high-level — Basic — commands into low-level plotter instructions.

Those instructions are converted into 'Draw a Line', 'Draw a Circle', and so on. Some plotters have text modes in addition to

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their ability to draw lines. Where text modes are not implemented in the plotter's repertoire in the same way as text is treated line and arc segments.

The Penman differs from conventional table or platen plotters mainly by incorporating three pens, a drive motor system and an optical sensor in a turtle-type carrier head, connected to the main body of the controller unit by a ribbon cable. Except for this umbilical cord, the head moves as an independent entity over the sheet of paper, which is held in position on a black plastic sheet with tape.

The controller unit, connected to the QL by a serial link to the ser1 port, keeps track of the QL commands, the turtle position and current status. Data is transferred between turtle and controller for pen position, pen selection and current direction of travel.

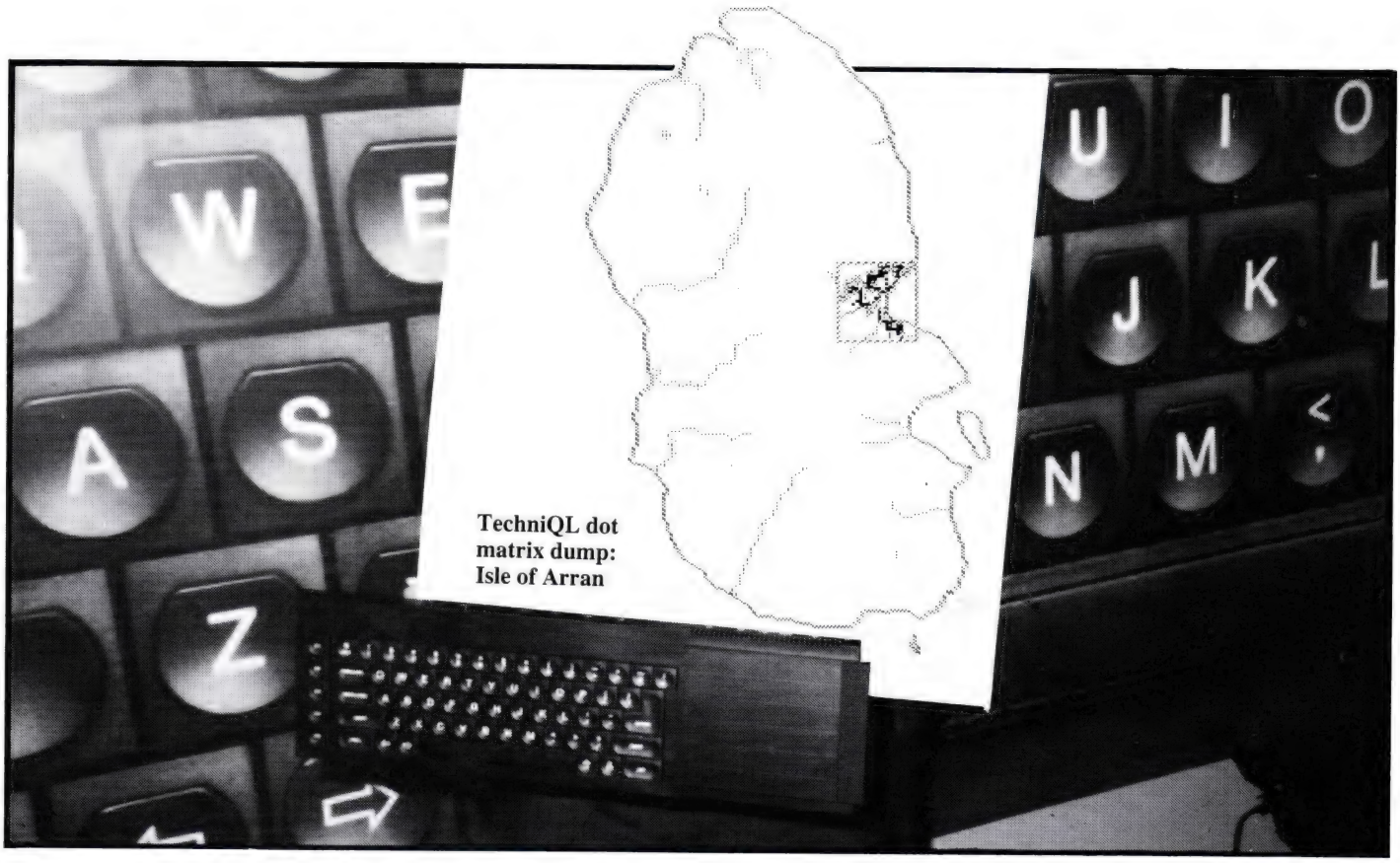
An optical sensor on the bottom of the turtle detects boundaries of the drawing area. After completion of a cartesian move, the turtle returns 'home' for the position of its left and bottom boundaries. During changes of pen, the turtle pauses and then displaces its position by the distance separating the pens in their holders.

The Penman turtle will accept a range of drawing implements which include pencils, capillary and felt-tip pens but a number of precautions should be observed when selecting ink pens as drawing implements. Although special fast-drying, water-based red, blue, green and black pens are included with the unit, pen adaptors allow you to use any of several proprietary brands of fine-point, felt-tip pens, such as those produced by Pentel.

Care must be exercised when using pens with alcohol-based ink; there is a tendency for the ink to dry too quickly and, unless plotting is to start immediately on installing the pens, it is likely that the nibs will be too dry to distribute the ink on demand. Failure to observe these minimal requirements will mean either smudged drawings every time the ribbon cable or a turtle wheel passes over a recently-drawn line, or a failure to plot whole sections of a drawing. Because of the method used to move the pens to their required positions, a number of minor positioning inaccuracies are almost inevitable.

Motion of the turtle wheels is monitored by the method used by a mouse, with photosensors. The turtle sensors can detect a rotation of the shaft of the wheel corresponding to a linear movement of 0.07mm. — resulting in a possible position error of plus or minus 0.07mm. in 45mm. of linear travel.

Another source for positional discrepancies is caused by wheel slippage occurring in a direction parallel to the motion of the wheels, due in part to the acceleration of the drive motors. Frequent updating of the turtle position, after a sequence of moves, by the return of the turtle to its 'home' position prevents



position errors accumulating and keeps them to a minimum.

As supplied, the Penman is complete with plotter unit, a range of pen colours, paper and a comprehensive manual. Because it is sold for use with a wide range of computers, the kit does not include a serial printer lead, which must be obtained separately.

Transform can supply the lead, 6ft long, with suitable plugs for the QL ser1 port and a 25-pin D connector at a modest price. After a considerable amount of cross-testing, the only possible conclusion I can reach is that TechniQL, TechniFont and the Penman plotter are a very powerful team.

Applications for TechniQL and its support program TechniKit are wide-ranging; whether for really useful technical drawings, graphic arts — such as letterheads, packaging or labels, to mention a few — flowcharts or any form of diagrammatic representation, the program copes very well. Being more specialised than conventional drawing programs, TechniQL lays the burden of pre-planning and organisation on the user.

I liked the Penman. Without reservation, it is a superb, moderately-priced plotter; it does what it is designed to do and does so very well, by providing facilities seen on plotters costing considerably more.

Minor inaccuracies of the Penman can be tolerated by all but the most demanding drawing requirements. It is certainly capable of dealing admirably with any type of reproduction of which the QL is capable.

Where a greater degree of accuracy is required, users can modify the SuperBasic utility supplied by Talent, TechniPlot, so that it calls for a 'home' check more often. While that may slow drawing somewhat, it further minimises the possibility of inaccuracies in reproduction.

Update on CP/M emulator for QL

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Within a few days of the *CPMulator* report being completed for the June issue, more exciting news was received of latest developments from Arnie Gardener at Sandy U.K.

Having acquired world-wide distribution rights, Sandy says its official release version of the CP/M emulator incorporates modifications to the original program system which increases its speed considerably.

The review version of the CPMulator EPROM took about 4K of space; the release version of the EPROM is just short of the full 16K capacity and provides significant improvements.

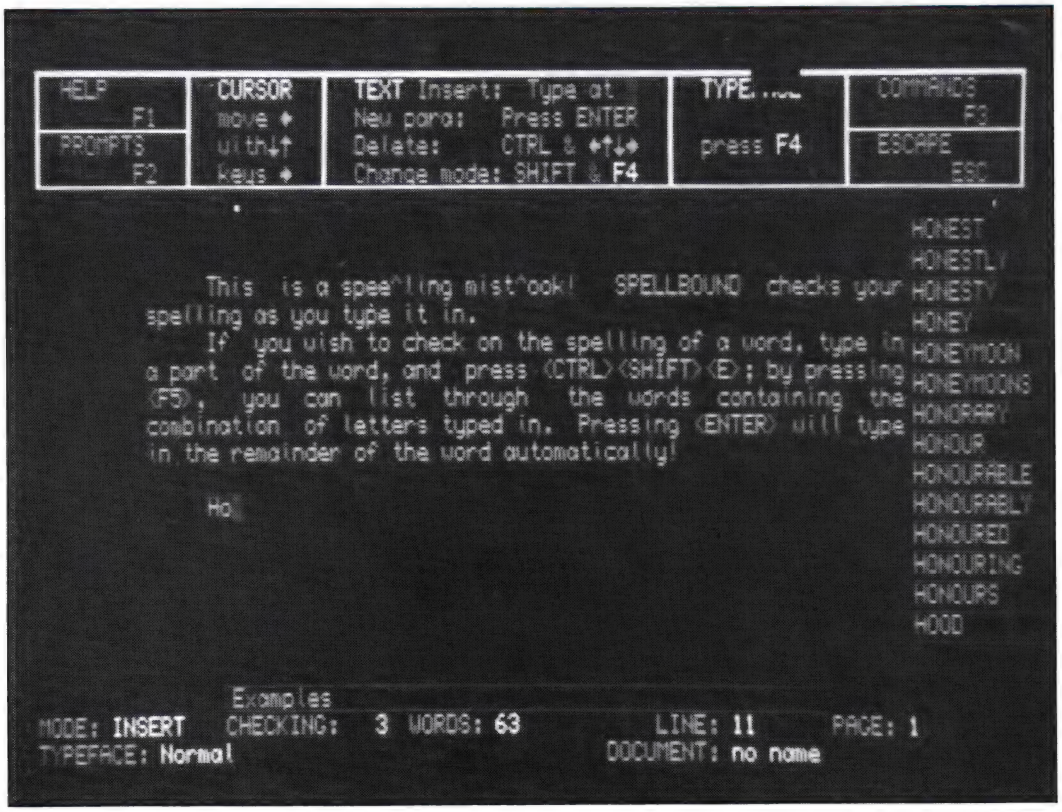
Most notable is the *WordStar* character handling speed in the QL environment. When the package was tested originally it was possible for a reasonably fast typist to get well ahead of WordStar character input on-screen; the release version has improved screen-handling to a point where character handling lags only slightly behind that of a fast typist.

It must be stressed that any speed loss experienced in CP/M programs run on the QL is due to the display handling and not to program processing. As a practical demonstration, a *Sieve of Eratosthenes*, compiled with Borland Turbo Pascal, was run and obtained 1,899 prime numbers in slightly more than three seconds.

Modifications have also been made to the emulator's *RDCPM* utility, improving the transfer of programs from original CP/M volumes to the CP/M format somewhat easier.

Spellbound

If the shorter Oxford English Dictionary and TV programmes like Call My Bluff are your bag, read this



Product: Spellbound
Price: £29.95
Source: Sector Software, 39 Wray Crescent, Ulnes Walton, Leyland, Lancashire PR5 3NA. Tel: 0772 454328.

It seems to matter little how literary-minded anyone is. We all have moments when the correct spelling of a word eludes us. If you are tired of documents containing speeling mistooks or hunting frantically in a conventional dictionary, the Sector Software *Spellbound* could be the answer for you.

The first QL spelling checker, *Qspell*, released by Eidersoft in the early days of the QL, provides a 25,000 supplied vocabulary and is expandable by a maximum of 1,000 additional words. A completed document, filtered in its Quill doc form through the Qspell system, can be flagged optionally for any errors found and subsequently corrected, after re-loading it into Quill.

Unlike Qspell, from which a part of the massive Spellbound 30,000-plus word vocabulary database has been derived, spelling is checked while it is being typed-in and users have several options available for indicating errant or elusive words.

Monitoring

Consistent with other Sector business-orientated software, using Spellbound could not be easier. It can be loaded with its own boot or its loading can be called from within the boot of any program requiring spelling monitoring and loaded with, as an obvious example, Quill.

Most Spellbound work occurs unseen by the user. Command keys have been kept deliberately to a minimum and provide more than adequately all of the facilities or prompt permutations required.

(CTRL) & (D) — Delete an existing word.
(CTRL) & (E) — Examine the vocabulary list for the letters entered up to any given point.
(CTRL) & (O) — Switches on Spellbound.
(CTRL) & (P) — Put a new word into the dictionary.
(CTRL) & (W) — Write a dictionary containing new words added in subsequent sessions.

Switching off Spellbound or its WRITE command is done by using any cursor movement, besides (CTRL) & (LEFT), or the (F3) or (F4) command entry options. Five levels of incorrect spelling indication are available:

(CTRL) & (1) — Minimum level of prompting — visual prompt only.
(CTRL) & (2) — Visual and audible warning of a misspelling.
(CTRL) & (3) — (default) Visual, audible and inserts "" where the spelling departs from words available to the dictionary vocabulary.
(CTRL) & (4) — Visual, audible and a momentary pause at the point where a word departs from its expected spelling but allows you to continue.
(CTRL) & (5) — Visual and audible warning. Also inserts the "" into the errant word and refuses further input until deliberate corrective action is taken.

rl1 When Spellbound is activated in Quill, its presence is announced between Quill "MODE" and "WORDS" messages with the message "SPELLBOUND" and the level number of the prompt. As words are typed, the message is changed briefly to "CHECKING" and reverts to the original message when (SPACE) or a punctuation mark is input. It is as fast as that; no discernible loss in

typing speed can be detected.

If you are looking for the spelling of a particular range of words included in the Spellbound vocabulary, switch on Spellbound and type the portion of the word needed to narrow the range of words to those containing only the combination of letters for which you are searching.

Entering "PARAL" and pressing (CTRL) — (E) (for Examine) opens the vocabulary window, 17 rows of 11 characters, to the right of the screen, produces a list of eight words — unless you have added more — from "parallel" to "paralysis".

Window

Typing the letter "P" and (CTRL) & (E) will list all the words beginning with "P" in the vocabulary window; if the list is too long to be shown in its entirety, pressing (F5) will continue with the listing to its completion.

As additional letters are typed for any given word and the (CTRL) & (E) command keys are pressed, fewer words are included in the list until, finally, the only words contained in the list are the typed word and, possibly, its derivatives.

Words requiring an uppercase first letter are indicated in the dictionary with a white first letter. All other words, indicated completely in green, are acceptable in either case. Entering such words you are offered the option of having them checked only in their uppercase form or not.

Users have the option of loading or saving either the default dictionary or as different sets of spelling files for particular specialised applications. Consideration of the monumental task carried-out by Spellbound is truly mind-boggling. As successive letters are entered for each word, it must search its vocabulary data and, if a match is not found, action is taken to alert the user.

Adding words to Spellbound comes naturally. As you type, words being entered are checked for spelling and availability. If a word is not in the dictionary, Spellbound assumes that the word is typed incorrectly and a "Not found" message is output.

Derivatives

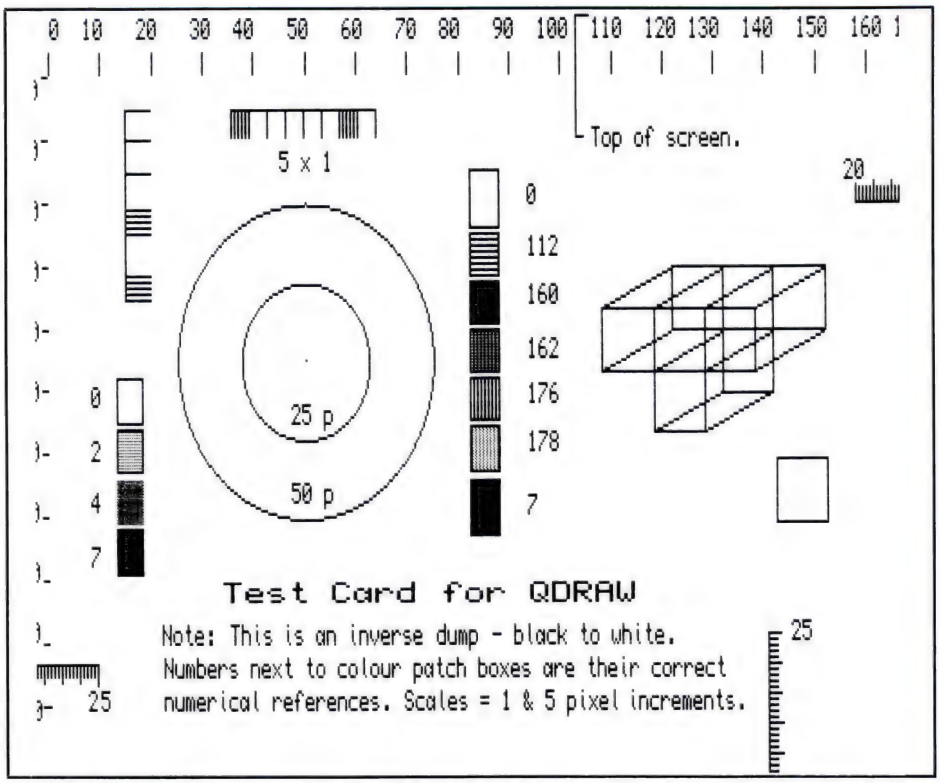
You then have the option either of adding the unknown word to the dictionary or ignoring the warning. By pressing (CTRL) & (P) the word stack is lifted at the point where the word must be inserted, the new word is added to the vocabulary and you continue as before.

The choice of adding the derivatives of a particular word — singular or plural forms and tenses — or waiting until you have an occasion to use them is up to you. After spending a considerable time evaluating Spellbound, I concluded that Sector should also include a warning of the Government health type to the user. With the best will in the world, it would have been impossible to include all of even the most common words used by everyone. It is a distinct temptation in idle moments to type-in the odd few words to see if one can find a word not already among its already massive collection. Even more tempting is the inclination to add every word you encounter.

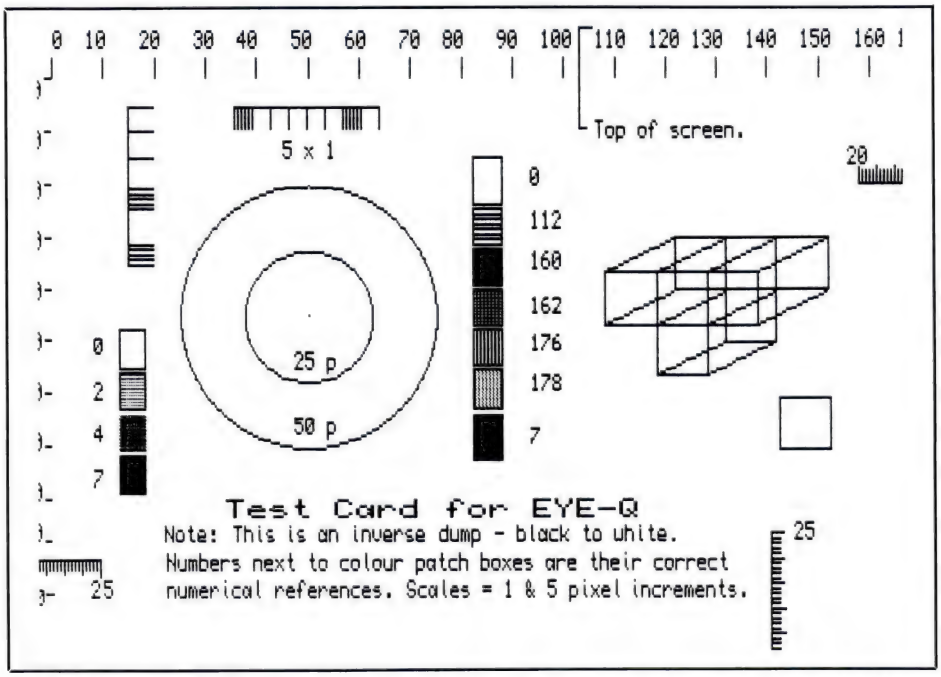
The only limitation is the amount of memory available to its users. If you succumb to the temptation mentioned and/or if you are interested in phrases such as pusillanimous machiavellianism, you could eventually have a problem with a memory shortage.

The Sector Software sister product, *Taskmaster,* was described in a recent review as the Rolls-Royce of the multi-taskers. In the same vein Spellbound must be described similarly but with some of the attributes of a Maserati. If you try to cross a Maserati with a Rolls-Royce, you can easily become spellbound.

Give your printer big graphics appeal



QDRAW's dump demonstrates the problem with making a compromise between vertical pixel measurements in their correct relationship and drawing circles and squares in correct proportion. Colour representation is well represented.



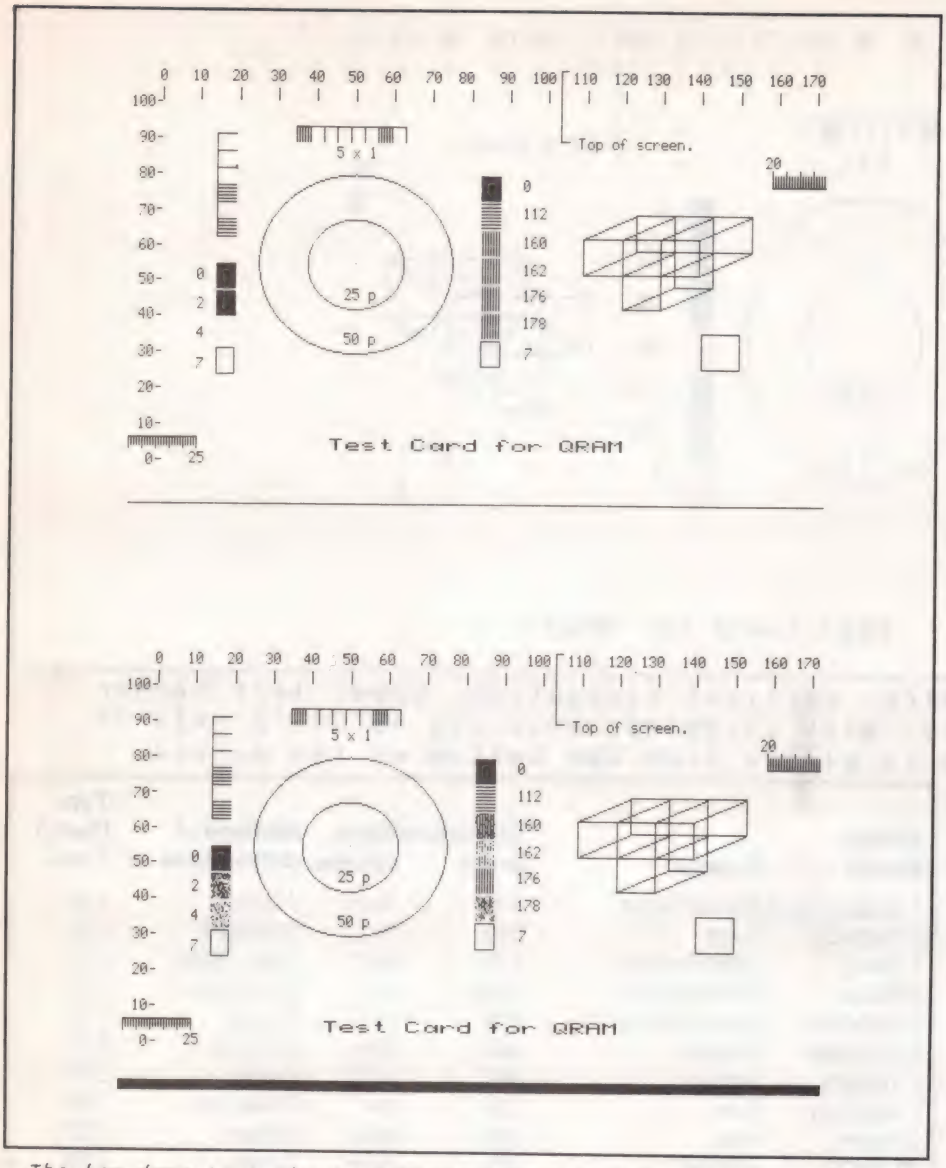
This dump, made from the EYE-Q utility, has been optimised for circles for the Canon PW1080A printer. Some compression has occured in the vertical scales because of the line feed requirements. Also, clipping has occured at the bottom of the page (two pixels); the left side of the page (eight pixels) and the right side of the screen (eight pixels).

Ron Massey dips his finger into the stunning array of rainbow colours available on printers and plotters

Using dot matrix printers to obtain hard copy from a screen image is only one of several ways to make permanent copies. The majority of graphics programs incorporate routines for producing black and white prints using a dot matrix printer. Additionally, a few dedicated printer driver proograms are available which offer special features, such as re-configuration facilities for non-Epson-compatible printers and facilities for re-defining monochrome representation of colours and stipples.

Monochrome printing, like its photographic counterpart, is often more difficult than reproducing colour. If for no other reason, monochrome requires that each colour, tone and stipple, be readily identifiable as an individual step in a tone scale.

When a printer dump program is written, a number of options must be considered, almost always resulting in of a number of compromises:



The top dump is a standard QRAM dump. The lower dump has had the "RANDOM" option selected in order to emphasize the difference between red and green. Three of these dumps will fit on an A4 page.

a. Distortion — the ability to reproduce a screen circle as a printed circle;

b. Colour representation — translation of the range of colours into distinct representative tones on a grey scale;

c. Dumps should be as universal as possible, which means that, in practice, they are usually produced for use with Epson-compatible printers;

d. Variables encountered with printer hardware:

1.Either 7- 8- or 9-wire printing heads;

2. A range of control codes used by different models of printers, as well as baud rates, line spacing and whether the most significant bits in each byte of data appear at the top or the bottom of the printhead;

3. Cater for printers which offer a range of graphic modes.

Generally, printer dumps may work in one of two ways:

a. Horizontally on a vertical sheet of paper, in the same orientation as on the screen. They sometimes produce one pixel per dot translation.

b. Vertically on a vertical sheet of paper by translating bytes from a column on either the left- or right-hand side of the screen.

Many prorams utilise special features such as allowing the user to select the screen area which will be passed to the printer; others, such as the Tasman *Tascopy*, provide a separate operating system for customising their printer driver for individual printer types, as well as the option for re-define the monochrome translation of the colours.

TechniQL took on exceptional approach in its printer driver by giving the user the option of selecting both the area to be printed and to select the size the drawing is to occupy in the screen area. One of the most common compromises utilised in dump routines, to obtain the best possible fidelity, restricts the screen area available for printing.

The TechniQL and Shadow Games printer dumps achieve maximum possible accuracy by maintaining a strict mathematical ratio of height to width. TechniQL does it by printing a user-defined area within the square "viewing port" of the screen. The Eye-Q printer dump minimises distortion by controlling the graphics mode line-feed, which can cause a certain amount of printing overlap.

Taking an entirely different approach, the Shadow Games printer dump, displaying the most accurate reproduction of the 14 dumps reviewed, will print a maximum screen area of about 440 x 200 pixels, corresponding roughly to the TV-sized window, over virtually an entire A4 sheet of paper.

Describing the design requirements of a printer dump, Allan Ovens of Shadow Games says: "To obtain strict accuracy, a full screen print will exceed the length of A4 paper. That is a restriction imposed by the physical characteristics of printers. Printer driver options available either will produce a distorting dump routine, require longer than A4 paper or reduce the relative size of the screen area available for the printer."

He adds: "Printer heads produce dots which are usually 1/72in. in diameter. A mechanical limitation forced on an accurate printer driver in high resolution, for example, requires a minimum possible vertical — on the printer, but horizontal on the screen — size of two print dots per screen pixel, so as to allow enough variation for shading.

"The horizontal — on the printer, but vertical on the screen — print size of each pixel can be varied much more than the vertical but the ratio of horizontal to vertical must be maintained or circles will always look egg-shaped."

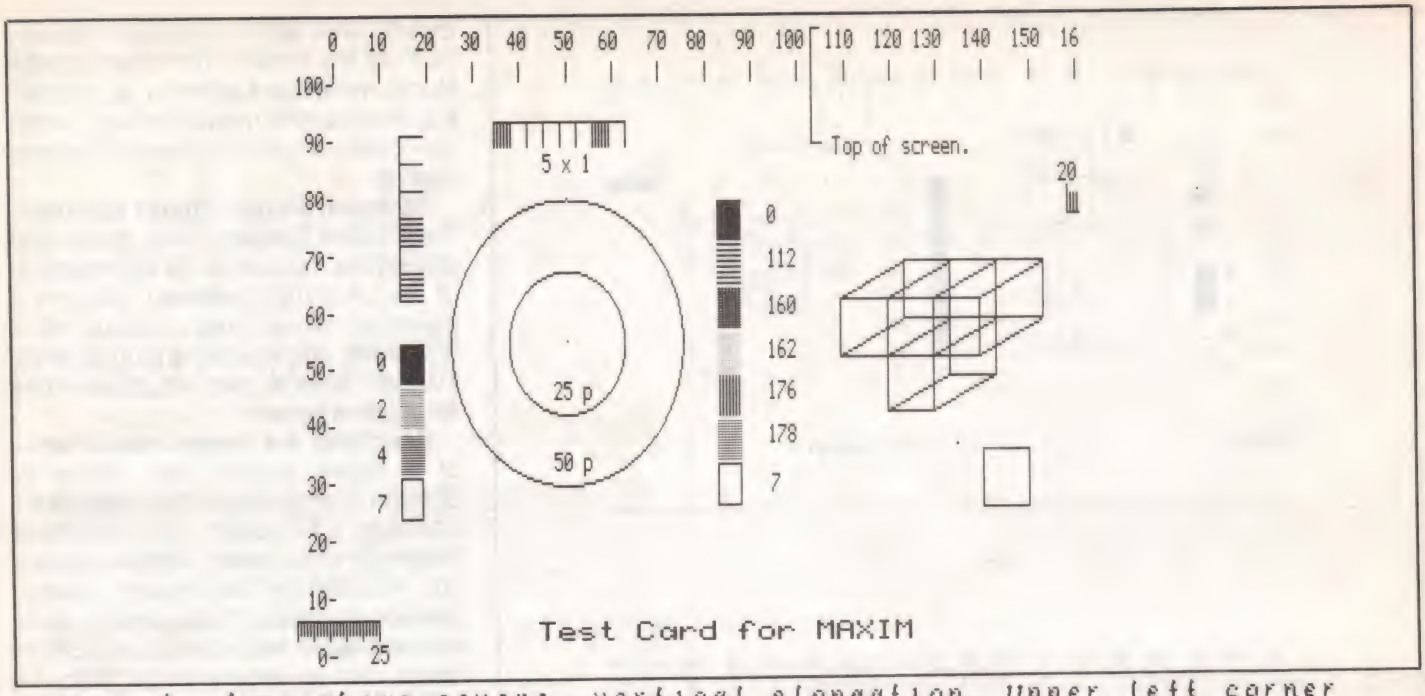
Printers, such as the Eidersoft Juki 5520, provide the option of full-colour hard copy. One of the better colour printers, the Juki, uses a four-colour ribbon — black, cyan, magenta and yellow — and also requires additional control codes from the printer dump to select the separate colour bands.

The complete colour spectrum is achieved by over-printing magenta and cyan, to simulate red; cyan and magenta, for blue; or yellow and cyan for the green. In addition to graphic dumps, the user has the option of producing letter characters either in draft mode or in near letter quality in full colour.

The Juki, incidentally, is available in its 5510 monochrome configuration and may be upgraded later to the full-colour 5520 specification.

While the quality of colour reproduction has improved tremendously in the last few years, colour printers are still confined to the same restrictions imposed on any form of printing.

One of the tricks with press printing, to minimise colour ink limitations, is to use a four-colour process in which each of the darker colours also includes a



Maxim's dump shows severe vertical elongation. Upper left corner defines print boundary, with clipping occuring by 16 pixels on the left and more than 12 pixels from the bottom of the screen.

proportion of black ink to improve image depth.

Inks available for ribbon printers limit the brilliance of some of the colours, most notably the reds and yellows. Formulation trade-offs of the chemical composition of inks dictate the maximum brilliance obtainable with any particular ink type.

Undoubtedly other approaches will become commonly available in the near future, improving colour printing quality. One approach being considered by manufacturers is using photocopier techniques of bonding plastic pigment thermally to paper. A printer of this type was recently released by Io for around £5,000.

Printer dump performance

This chart is a representative example of dumps printed by a Canon PW1080A printer with mode 4 dumps, A4 paper size, and transport occurring on the long axis of the paper.

Normal and inverse notation refers to print occurring as black to black or black to white translation respectively. A negative dump produces complete tone reversals.

Where possible, test cards have been printed from the same screen file to achieve a degree of consistency. Where that has not been possible because of the methods used by some graphics programs for file-saving or screen sizes pertinent to particular programs, drawings produced with the programs have included colour patches and circles to derive performance figures given in the following comparison chart.

Printer Dump	Source	Distortion error	Tone repres.	Method of define Area	Typ Dump Time
1. Shadow Game	Shadow Games	0.4%	Norm	4 Cur bars	1:47
2. TechniQL	Talent	0.5%	Inv	Scrn define	2:03
3. Eye-Q	Digital Precision	2.2%	Neg *	Cuts L,R&Bot	2:17
4. Miracle	Miracle Systems	8.5%	Inv	Dim/Default	0:56
5. CAD PAK	DataLink (Wales)	22%	Inv **	Full scrn	1:55
6. QL Peintre	Pyramide	34%	Norm	4 Cur bars	8:58
7. Tascopy	Tasman	35%	Inv ***	Full scrn	2:05
8. Gprint-prt	Psion	23%	Inv	Dim window	1:58
9. Maxim	Intec	23%	Norm	Full scrn	1:53
10. ArtICE	Eidersoft	24%	Norm	Cur box	1:59
11. RAM disc	DS Enterprises	24%	Inv	Sm than scrr	2:01
12. Lotus Soft	Lotus Soft	24%	Norm	Sm than scrr	1:36
13. QDraw	Psion	24%	Inv	Full scrr	2:16
14. Scrncopy	DataManagement	61%	Norm	Sm than scrr	1:59

* Printer driver can be re-configured to produce required codes for non-Epson-compatible printers. Tonal representation is in negative with the Canon printer.

** Printer driver prints inverse but temporarily reverses black and white automatically.

*** Printer driver can be configured to print in either normal or inverse black and white.

Dump colour definition	Print	No. Per A4 page
1. Full colour and stipples	Vert	1
2. Does not differentiate red and green	Horiz	2
3. Can be configured for printer LF; negative represent.	Horiz	2
4. Prints black and red as white; white and green as black	Horiz	3
5. Full colour and stipples	Horiz	1
6. Red and green print the same; full stipple range	Vert	1
7. Full colour and stipples	Vert	1
8. Prints black and white reversed.	Horiz	1
9. Full colour range; some stipples hard to distinguish	Horiz	2
10. Red and green print the same; some stipples difficult to distinguish.	Horiz	2
11. Full range of colours and stipples; white as black	Horiz	1
12. Red and green print the same; some stipples difficult to distinguish.	Horiz	1
13. Full colour and stipples; white prints as black	Horiz	1
14. Black and red as black; white and green as white	Horiz	4

Colin Opie looks at some of the concepts behind the Qdos routines available for interfacing work.

Many people who want to control devices from a QL will be more than happy with the SuperBasic extensions found in the Qontrol-II ROM described next month. Some, however, will be keen to improve and confirm their skills in assembly language programming. For those in particular we look now at the concepts behind the Qdos routines available for interfacing work.

The utility calls with which we are concerned here will enable us to request and release common heap areas, manipulate linked lists and queues, perform serial I/O operations and check device names. The utilities may be grouped into different types, although the method of accessing them is the same — through vectors. The appropriate call parameters are set up and then a subroutine call is made to the required vector. For example, to call the utility UT.UNLNK at vector $D4 the following may be used:

```
:                       ;(Set call parameters)
:
move.w    $D4,a4        ;Select 'unlink' utility
jsr       (a4)
:
:
```

The principle of the linked list is simple enough, as figure one shows. A list pointer will point to the start of a list of nodes which contain two major compartments, an item stored in some form of data structure and a pointer to the next node in the list. There are a number of types of linked list, their differences being in the type of pointer system used and the form of the data structure in each node. So as not to become side-tracked in technicalities, we will concentrate on the type of linked list shown in figure one, as it is the type assumed by the utilities in which we are interested.

First we must have a list pointer, or we will have no way of starting the linked list. if there are no nodes — i.e., the linked list is empty — the list pointer will hold the value zero. A node to be entered into the linked list can be of any required size, because the utilities assume the use of a blocking-type linked list.

The important point about the block node is that there must be space at the start of the block for a link pointer. A nodal link pointer will contain a pointer address if it is not the last node in the list, or zero if it is the last node. There are standard algorithms for inserting and deleting nodes in a linked list about which we do not have to worry on the QL, as the utilities perform those operations.

A queue is a particular type of data structure where data is fed in at one end and retrieved from the other. An everyday example is the polite bus queue. The data objects, people, join a queue at one end. When a bus arrives the people get into it from the other end of the queue. There is, of course, no reason why both operations cannot run concurrently. The size of the queue will vary depending on how many people join the queue at one end and how many people leave the queue at the other end in a fixed period.

At that point the analogy must stop. Figure two shows a bounded queue structure as used in the Qdos utilities. One job may place bytes of data in at one end of the queue and another job may remove bytes from the other end. In the QL the two jobs may, of course, be a single job — in the true sense of a Qdos job — which has two procedures. One procedure will deal with the input to the queue while the other will deal with col-

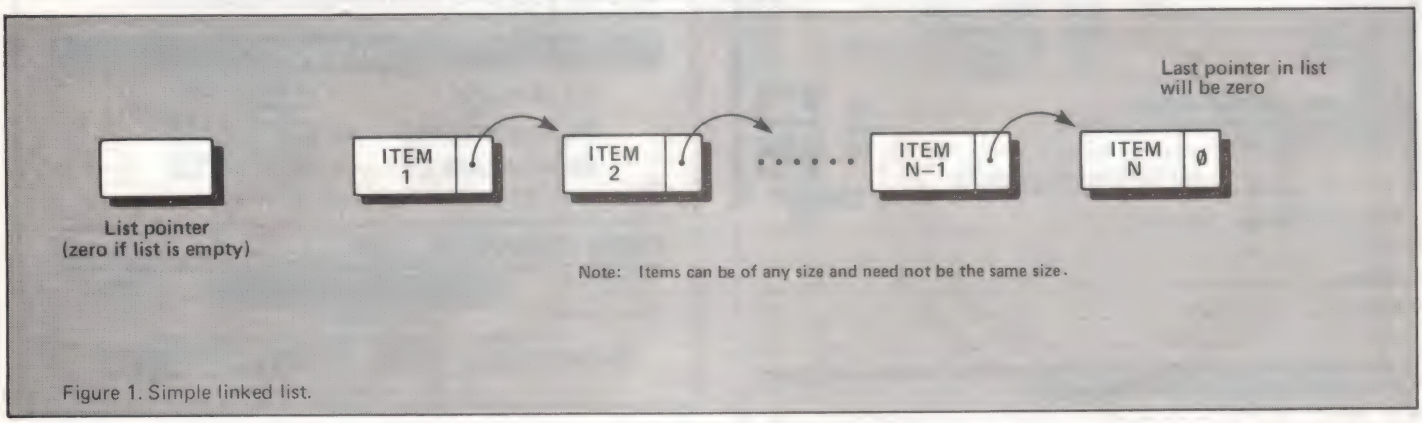
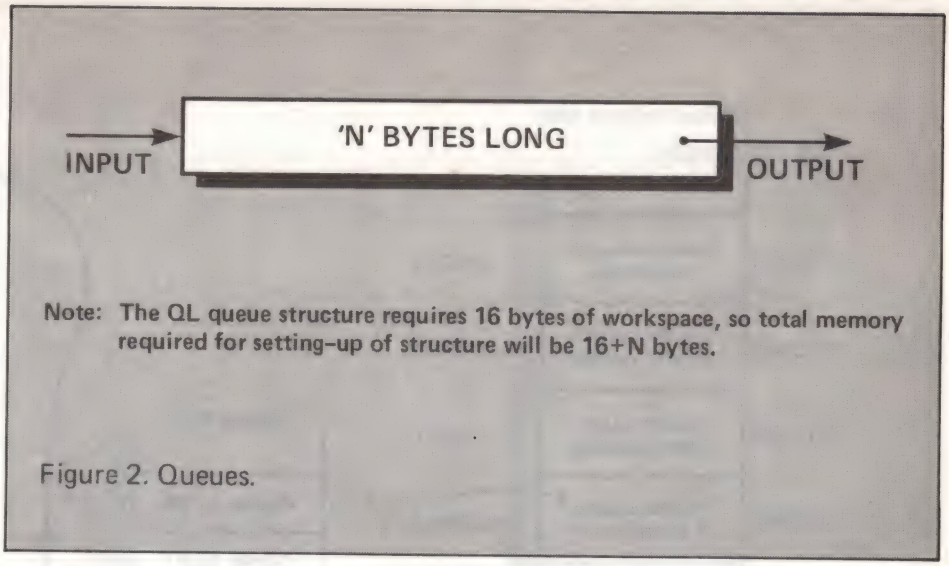


Figure 1. Simple linked list.

lecting the date from the queue. The queue has a fixed maximum length and may therefore become full if data keeps entering the queue without data being removed.

The converse is also true. The queue may become empty and unable to supply new data if data is being removed at a continuously faster rate than it is being entered. One particularly suitable use for queues is in the area of I/O, where the queue can act as a storage buffer between devices running at varying and/or different speeds.

The queues set up and manipulated by the utilities need 16 bytes at the beginning of the specified storage area for a queue for internal management purposes:



Note: The QL queue structure requires 16 bytes of workspace, so total memory required for setting-up of structure will be 16+N bytes.

Figure 2. Queues.

Offset	Size	Use
$00	bit	End of file flag (MSBit)
$00	long	Link to next queue
$04	long	Pointer to end of queue
$08	long	Pointer to insert location
$0C	long	Pointer to retrieve location
$10		(Start of queue)

It is not particularly important that you know about that management data structure, other than that you must set up your queue by specifying a queue length 16 bytes greater than the size of the queue you want.

As with linked lists, there are standard algorithms for queue manipulation. The algorithms cater for insertion, deletion and the testing of bounded queue status. It is that kind of operation the utilities provide for us.

Qdos maintains a channel resource management table, which holds such information as the highest known channel number, and so — on see figure three. Two pointers within the table, SV CHBAS and SV CHTOP, point to the base and top-of-the Channel table respectively. The pointers in the channel table — long-words — point, in turn, to the corresponding channel definition blocks. Figure three shows the layout for plain serial queues.

This layout is simple but is all that is required if the serial I/O can be managed successfully by the use of input and output queues. In such cases the utility IO.SERQ — vector $E8 — may be used to perform direct queue handling with a number of standard I/O procedures. If the input and output routines for the data need to be more complex, the utility IO.SERIO — vector $EA — should be used and the addresses for the specialised I/O routines supplied with the call.

The utility IO.NAME — vector $122 — can be used to check a supplied device name for correctness and, if correct, return the default and/or given parameters. That is useful and will save you a good deal of work.

There is a standard format for the definition of device names which embodies the specification for the name, any parameters, and any additional codes. The definition must have the following form:

Size	Description
word	Number of characters in the name
(even number of bytes)	Name (padded with zero if odd length)
word	Number of parameters
('n' parameters)	

Each parameter definition may take one of three forms:

1. A space plus a separator, followed by the default value. Both parts are of size word, implemented by, for example:

```
defb  ' '
defw  448
```

CONTINUED OVER PAGE

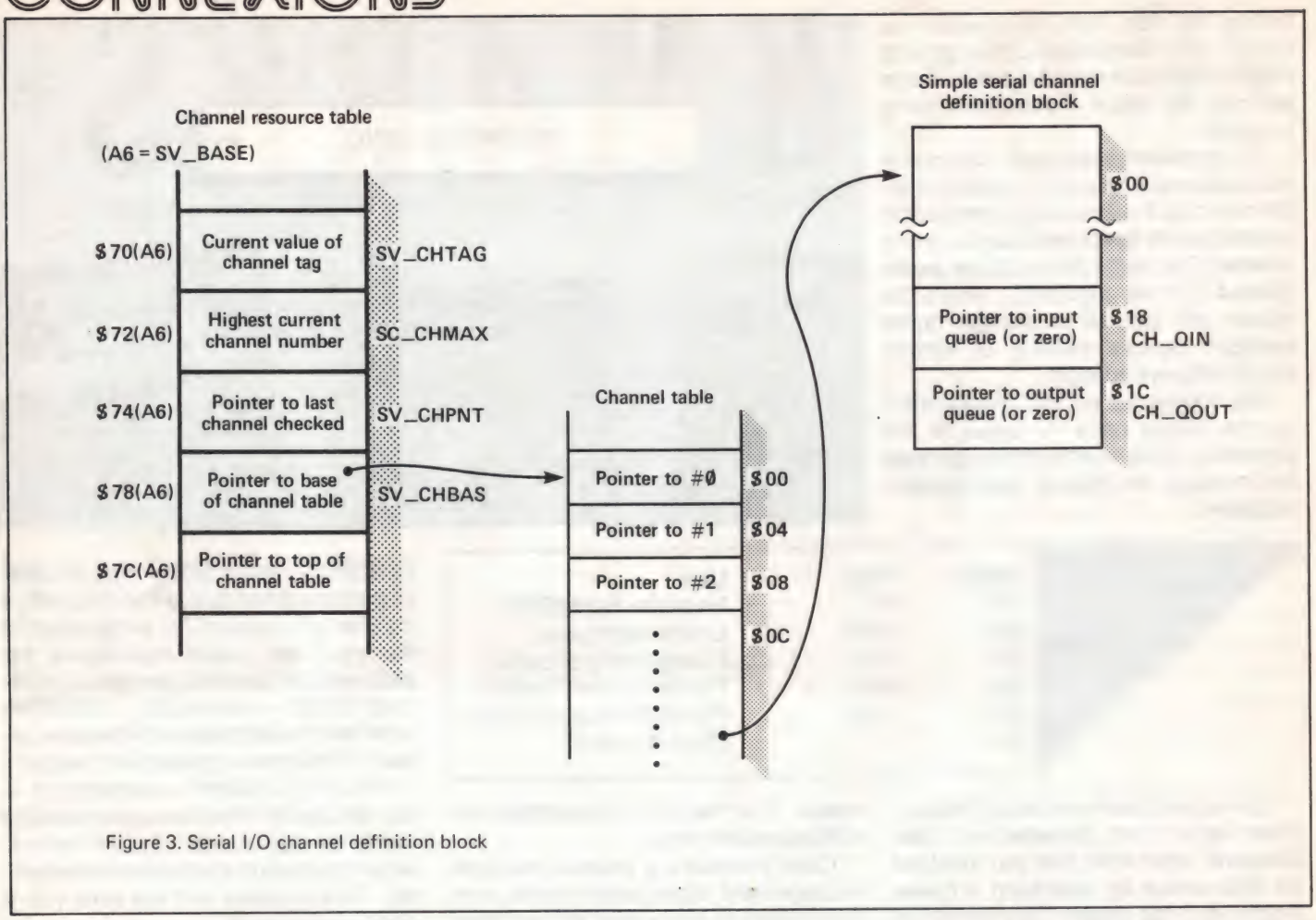


Figure 3. Serial I/O channel definition block

2. A negative number — e.g.,-1 — followed by default number. Both parts are of size word, implemented by, for example:

```
defw-1,2
```

Note that in this case the default value is appended to the name with no separator.

3. Number of codes, followed by the list of codes. The number of codes is of size word and the code list must be an even number of bytes, padded by a zero if necessary. For example:

```
defw  3
defb  'POI',O
```

All alpha characters in the definition must be in upper-case. For each numeric parameter — i.e., types 1 and 2 — the utility will return either a supplied value or the default value given in the definition. For each code parameter — type 2 — the utility will return the position of the code in the definition list; the first code has a positional value of unity, not zero.

There are two examples, catered for by Qdos already, which highlight the definition structure described. They are the internal definitions for the console and the serial ports. First, let us look at the console definition:

```
defw 3              ;console
defb 'CON',O
defw 5              ;five parameters
defb ' '            ; - window size (2)
defw 448
defb 'X'
defw 180
defb 'A'            ; - window position (2)
defw 32
defb 'X'
defw 16
defb ' '            ; - kbd queue length (1)
defw 128
```

This definition for the console will enable us to supply, by way of example, the following legal codes:

Entry	Parameters returned
con	*448,180,32,16,128*
con 256	*256,180,32,16,128*
con 60	*448,180,32,16,60*
CONaOx12	*448,180,0,12,128*
con 256x 64a64x128-20	*256,64,64,128,20*

Parameters underlined represent supplied parameters in the given name. All the other parameters are supplied by the utility by virtue of default settings. Now let us look at the serial definitions:

```
defw 3              ;RS232 serial device
defb 'SER',O
defw 3              ;three parameters
defw-1,1            ; - port (default '1')
defw 4              ; - parity types
defb 'EOMS'
defw 2              : - handshaking
defb 'IH'
```

This definition for the serial ports will enable us to supply, by way of example, the following legal codes:

Entry	Parameters returned
ser	*1,0,0*
SERE	*1,1,0*
ser2mi	*2,3,1*

Note that, although the alpha characters in the definitions have to be in upper-case, the supplied names may be in upper or lower-case.

The different nature of each of the utility types — whether or not they are executed in supervisor mode — will be dealt with in the supplement document available on Microdrive through *QL World*. There will be no need for you to buy this item if you intend only to control things from Qontrol-II Control SuperBasic extensions.

We can discuss the overall use of registers now. Some utilities require address register A6 to point to some base address or variable table. Utilities which return an error code will do so in the form of a long-word in data register DO. If the error code returned is not zero, an error has occurred. Small negative codes are used to indicate the standard Qdos errors. Additionally, the error code returned can be a pointer to a specific error message.

BOOKMARKS

Book: Calculating with QL Abacus
Price: £7.95
Source: Longman Group Ltd, Longman House, Burnt Mill, Harlow, Essex CM20 2JE.

Continuing the superb format developed by Longman in its series of practical QL applications, Malcolm Smith's *Calculating with QL Abacus* makes no assumptions regarding readers' level of experience with either the QL or the use of spreadsheets.

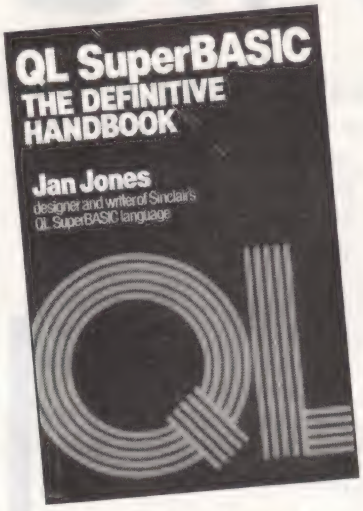
Divided into four distinct sections, the first chapter, in the form of an introduction, starts with a condensed summary of basic QL operations. Chapters two to nine provide clear and concise information for using Abacus, from basic theory of spreadsheets to using the system commands.

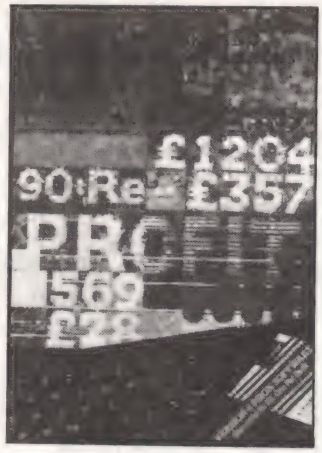
The biggest part of the book, however, is devoted to practical applications of Abacus in worked spreadsheet models. Throughout users are encouraged to amalgamate Archive, Quill and Easel.

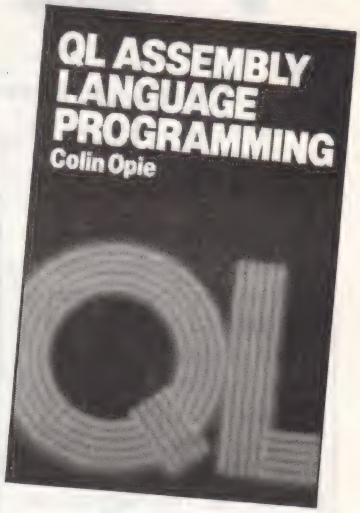
First of the models, computer-aided horse-racing selection, details methods of utilising readily-available racing form for improving betting odds. Calorie-controlled diet spreadsheets integrate user-applicable details for montoring constituent dietary elements to obtain the most efficient nutrition to expenditure of energy ratio.

Mortgage spreadsheets analyse particular mortgage structures, as well as comparing benefits obtainable from different types of mortgages. Share transaction strategy models help you to follow and assess share performances.

In spite of tremendous odds against selecting the correct eight football fix-







tures — well in excess of 1,000 million-to-one against — a significant number of people complete coupons every week. Using a spreadsheet to provide a method of calculation against past and present team form can and apparently does lessen the odds considerably.

Book: QL SuperBasic: The Definitive Handbook, Jan Jones **Price:** £9.95
Book: QL Assembly Language Programming, Colin Opie **Price:** £12.95
Product: Editor/Assembler **Price:** £12.95
Source: McGraw-Hill Book Co (U.K.) Ltd., Maidenhead, Berkshire.

Two books from McGraw-Hill, well worth consideration if you are looking for additions for your library of QL programmming reference works, are available for serious QL enthusiasts. Almost anyone who has done serious work with QLs has soon recognised that whole sections of the Users' Guide leave much to be desired. As computer documentation goes, it is certainly one of the better manuals but much of the information concerning SuperBasic, at least so far as users new to computing are concerned, is laconic almost to the point of being unintelligible.

Correcting the somewhat limited scope of the Guide, admirably, *QL SuperBasic: The Definitive Handbook,* by Jan Jones — also the originator of SuperBasic — goes a long way towards redress and covers every aspect of programming with SuperBasic.

Opening with an introduction as to why the author felt that another SuperBasic manual was necessary, he expresses dissatisfaction with the presentation of many of the other books on the subject. Related keywords are grouped in chapters and are each defined in great but highly-readable detail. One of the attractions is that, rather than relying on the usual dry glossary approach of other similar books, the author details the implications of SuperBasic keywords and has included lucid illustrations and syntax flow charts.

The second offering from McGraw-Hill, Colin Opie's *QL Assembly Language Programming*, is exceptional in that you also have the option of obtaining the *Editor/Assembler* around which Programming was written.

While not what could be described as a state-of-the-art assembler in that the program does not support macros, it is nonetheless a very good, professional-quality assembler with which newcomers to machine code programming can easily get to grips.

A companion cartridge to the assembler, program listings and assembled object code from the examples included in the Assembly Language Programming manual, is also available. A source of valuable experience working with machine code, the examples are also useful inclusions in a routines library. Divided into four main sections, chapters included in each part explains the internal workings of Qdos:

Part 1 details the 6800 processor instructions and addressing modes;

Part 2 opens with a description of the concept around which Qdos was built and goes on to esoteric instructions regarding the traps, utility routines and linking into SuperBasic;

Part 3 includes numerous programming examples and delves into graphics and SuperBasic extensions;

Part 4 provides information additional to the assembler and editor documentation.

Four appendices are included for quick reference to error codes, the 6800 instruction set, system calls and the editor/assembler.

TECHNICAL

Colin Opie answers some common problems about decimal points and floating point numbers.

No abacus

I am compiling a program which involves messing about with sums of money. To round to two decimal places, I am using the formula...where X = sum to be rounded.....X% =(X* 100+.5) does not exceed 32767, the error 'overflow' point. Can you suggest an alternative method?.....I do not wish to use Abacus in this instance.

R. D. Hardie,
Great Yarmouth.

It seems that the business user of the QL is not content with off-the-shelf packages, as indicated by the number of enquiries in recent months regarding the printing of numbers to two decimal places. Hardie poses the same question, having noticed that his simple algorithm of printing the value **INT(value*100+0.5)/ 100** fails to work with initial values greater than 327.65 pounds.

Not only is this algorithm limited to small initial values — far too small for even a one-man business — there is also the feature that it will not line-up the decimal point automatically when printing the result. The real task is to create an algorithm which will work for large numbers, e.g., at least up to a £1 million and align the decimal point automatically. The procedure shown in figure one is one solution.

The procedure which does all the work is between lines 200 and 320. The small program before that is to let you test the effectiveness of the procedure. Values up to 9999999.99 pounds, i.e., one penny less than 10 million pounds will be processed correctly. The result will always be displayed in an 11-character field. For positive values the left-most position will be a space and the rest of the number will be right-justified in the remaining 10 character spaces. Negative values differ from this only in having the left-most position filled with a '-' character. Should you need the floating point value of the displayed result it is a simple matter to change line 310 to:

```
310 PRINT v$(1 TO 10):
money=v$(1 TO 10)
```

That will set the global variable 'money' to the respective floating point value for use in later calculations. Should you wish to alter the working range of the algorithm, adjust the storage length of the string variable 'v$' and the initial (maximum) power of 10 stored in variable 'power' — see line 210.

It would also be very easy to change the procedure so that it printed the result to any specified channel. Pass a channel number in the command argument list and use this to adjust the final print statements:

```
130 display money(v,c)
:
200 DEFine PROCedure
display monney
(value,chan)
:
300 IF value>=0:
PRINT#chan,"-";
310 PRINT#chan, v$(1 TO
10)
```

The procedure will start printing the 11-character result at the current cursor position, so it would be easy to position the cursor, using 'AT' before calling the procedure if formatted screen displays were required.

```
100 CLS
110 REPeat loop
120 INPUT"Value?"; v
130 display-money(v)
140 END REPeat loop
150 STOP
160 :
200 DEFine PROCedure display-money(value)
210 LOCal v$(10),power,lz,v,i: power=1E6(:lz=0:
v=(ABS(value)*100+.5)/100: i=1
220 digit=INT(v/power)+CODE('O')
230 IF (digit>CODE('O'))AND(lz=0): lz=1
240 IF lz=O: v$(i)=" ": ELSE: v$(i)=.CHR$(digit)
250 i=i+1: digit=digit-CODE)'O')
260 v=v-(digit*power): power=power/10
270 IF power=.1: v$(i)='.': i=i+1
280 IF power >5E-3: GO TO 220
290 IF v$ (1 TO 10)='       .    ':v$='   0.00'
300 IF value>=0: PRINT ' ';: ELSE : PRINT "-";
310 PRINT v$(1 TO 10)
320 END DEFine
```

Figure 1. Money notation printing procedure.

VBaluing Mr T

When this program is run the value T which should be = 0 is not, which is puzzling, because we know this is wrong and have proved it by running the program on a new Commodore C28 computer, which correctly returns T = 0 Answer:

Could you explain this annually? This section of program is used for business.

Our GL computer is a JM 1.03 version.

```
5 REMark --- PROGRAM-
MING PROBLEM
10 CLS
15 x=PI
20 y=COS(x)
25 PRINT y
30 q=(y)
35 PRINT q
40 t=1-q
45 PRINT t
```

G.E. Chorley,
Bournemouth.

The trouble with using floating point numbers in computer systems is that a precise representation of all possible values is not possible. Further, some floating point algorithms, particularly those implemented in software and in general-purpose, low-cost microcomputers, are not so sharp around the well-defined limits as they could be.

The problem presented by Chorley is a brilliant example of this error in precision. It also indicates the fine line of difference between what the command PRINT thinks a number is and what that number actu-

HELPLINE

Write to: Technical Helpline, Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG.

ally is. Let us look at the short program closely:

```
10 CLS
15 x=PI
20 y=COS(x)
25 PRINT y
30 q=ABS(y)
35 PRINT q
40 t=1-q
45 PRINT t
```

When the variables 'y' and 'q' are printed, the results '-1' and '1' are displayed. So you think the program must be working but were the internally-stored values of 'y' and 'q' really the values shown? The answer is no. It is that PRINT thought they were close enough to these values as to make no difference, bearing in mind that any deviation was from a base value of unity.

When line 40 is executed, any deviation from the 'true' value becomes a deviation from a base value of zero. The PRINT command may not be able to display the 0.000000001 deviation from unity but it can certainly show it as a deviation from zero, i.e., as 1.0E-9.

So far as the QL is concerned you will always meet problems like this where the error in precision is beyond the sixth decimal place. One solution would be to fool the QL into thinking that PI was equivalent to a value other than that set internally in SuperBasic. You will find, for example, that setting **x=3.141594** instead of PI — set internally to 3.141593 — will produce results one might normally expect but I leave it to you to decide whether the 'correct' results displayed really are precise.

Oh Brother

I am writing regarding the advice given by Colin Opie on connecting the EP22 typewriter/printer to the QL in the February issue. I have one of these machines and unfortunately must differ over the assumptions. The EP22 is not like the EP44, either in print quality or facilities. As a cheap printer the EP22 is reasonable but as a letter-writing machine the quality of the print is nowhere near good enough for official correspondence, except sending letters to friends.

Denis Green,
Bournemouth.

As a Brother EP44 user could you outline the procedure for exporting documents from the EP44 to the QL and Quill? Some time ago a young programmer gave me a program to do this but it was only partially successful and has since become corrupted and useless.

David Drysdale,
Manchester.

Do you ever get the feeling you might have said something wrong? Green and at least two other people have written to say that the driver information for the EP22 in the February issue was not correct. Well, not entirely correct anyway. The cable wiring diagram given was correct and you should still abide by it. Unfortunately, though, the EP22 is nowhere near so versatile as the EP44 and setting it up for transmission is therefore much simpler.

The EP22 does not have a terminal mode but rather a printer mode. When in printer mode the only thing you can change is the baud rate, which you toggle between 75 or 300 baud by using the ENTER key. Something not mentioned in the February issue but common to both the EP22 and the EP44 is the use of the 'CONT' key to go on-line and the 'STOP' key to go off-line.

Finally, the Quill driver should be amended so that 'Chars/line' is set to 72 and the 'EOL code' is set to 'CR,LF' — both are needed. The EP22 does not support underlining and so all other parameters can remain unset. If you want to get the pound sign displayed properly you can set the 'TRANSLATE1' option to ",156'.

A number of people also latched on to the EP44/EP22 article. They asked how to get the text in the memory of the EP44 to go to a QL or into Quill. Once again, the wiring table in the February issue should be used to permit two-way communication between the EP44 and the QL. I will also assume that the EP44 terminal settings and the Quill driver are set up as shown in the February issue. Importing text into Quill is very easy. The question therefore is "How do we transfer text from the EP44 to a QL file?". The program in figure two will work admirably and can be adapted easily if necessary.

```
100 REMark EP44 loader
110 BAUD 1200
120 OPEN#3,ser1
130 OPEN NEW#4,'mdv2ep44doc'
140 PRINT'Press TEXT key on EP44...'
150 d$=INKEY$(#3,-1): d=CODE(d$)
160 SELect ON d
170 =26: GO TO 230
180 =13: PRINT CHR$(10);:PRINT#4,CHR$(10);
190 =10: REMark ignore
200 =REMAINDER :PRINT d$;:PRINT#4,d$;
210 END SELect
220 GO TO 150
230 CLOSE#4:CLOSE#3
```

Figure 2. EP44 loader program.

Run the program and, when asked, press the TEXT button on the EP44. The text in the memory will then be transferred to the QL file. An echo of the proceedings will be shown on the screen. You must type 'CODE Z' ON THE EP44, once all the text has been transferred, to get the program to terminate properly. You must import the file contents into Quill at some later stage if this is desired. Note that you cannot import directly into Quill using the device 'serl' as Quill will think that it is a file name on the default drive.

·PSION·SOLUTIONS·

Ron Massey digs into the bulging mailsack for your queries on the various Psion programs in circulation and offers instant help in these pages.

Three of the best

Three questions often asked regarding the Psion programs — besides printer-specific drivers — and, most particularly, Quill, are: Will Psion *XChange* be made available for the expanded QL? Is it possible to have more than 10 translate functions? Is it possible to set up screen defauts so that Quill will default to a no-prompts screen, or to specific page formats?

Although XChange is available for the Thor, despite the interest of QL owners in having it, it is not, at present, anyone's intention to take XChange over to the QL.

To put the situation in perspective, I have it on good authority that XChange Archive, Psion arguments to the contrary not withstanding, enjoys not a jot's difference from the current QL version of Archive. XChange, Quill and Abacus are not perceptably different from the standard QL versions either.

The principal differences between XChange and the QL Psion suite is that Easel includes a facility for 3D graph representation and XChange includes a built-in switching routine. If having a switching routine is important to you — I use one all the time — you may care to consider acquiring *Taskmaster*, a genuine multi-tasker with code-sharing capabilities, or *QL Switch*, to name two, which equal or surpass the system available to XChange users.

Although it is possible theoretically to alter Quill start-up defaults, it is definitely not to be recommended. If you have the ability to modify Quill code to that extent, it may be possible to have a Quill which is still reliable but I feel that there are other, simpler ways around the problem which involve far less risk.

One of the alternative solutions is to use *Keydefine*, available from Psientific Software and other suppliers, to define a single key — used with ‹ALT› — to format the screen and page layout to particular requirements.

Taskmaster includes a versatile facility for building command files for this and a variety of similar applications.

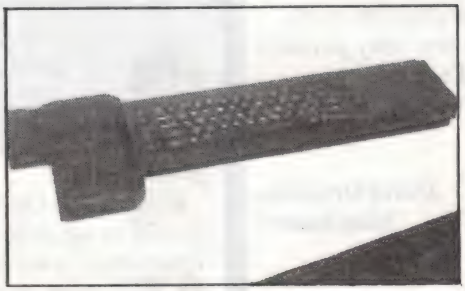
The Psion Solutions team is investigating the possibility of producing a printer driver containing more than 10 translate options. Watch this space.

Dumping Archive screens

From W. Moyle, of Didcot, Oxfordshire, there is a request for information regarding printing an Archive screen, complete with the text produced by Sedit. The best solution for this requirement depends on a number of factors such as exactly what form of dump is most useful but, most important, how much memory is available to run any of the various utilities suitable for the job and, where extra memory is not available, what compromises are acceptable.

If the imbedded information contained in a screen produced by Sedit is what is required, Chas Dillon's *Archive Screen Format Printer*, marketed by PDQL, may be the answer. This valuable utility was reviewed in the February Utility File and further details can be obtained by contacting PDQL.

If printing Archive screens, complete with Sedit-originated text, along with selected database records is what is required, a utility which may be ideal for



the purpose is QJump-*QRAM*. Intended as the service front end for the Sandy *Futura*, QRAM includes a range of good graphic drivers for several types of mono and colour dot matrix printers which can accommodate up to three graphic dumps on a sheet of A4 paper and may be represented as normal or inverse dumps.

A different approach towards the same end, *QKick* is another type of background utility but it does not include a graphic printer driver; 32K screen dump files may be made of selected records and later printed as a group. If the dumps need to be modified for changing colours, most graphic programs — *Eye-Q* is a particularly good — include a re-colour facility.

Both solutions are store-intensive. QRAM cannot be run in a standard 128K QL, at least not alongside any of the Psion programs; QKick works only with either disc drives or RAM disc — it does not work with Microdrives.

I have seen three prototype graphic printer spoolers in the last two months which use a hotkey to call their routines.

Send your questions on Psion subjects to Psion Solutions, Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG
Include your name, age and full address.

·PSION·SOLUTIONS·

D. Shillam, of Ealing, London W13, says he was disappointed to learn that *QL Turbo Quill*, reviewed recently in Utility File, offered only a 10 percent increase in speed. His letter adds that his range of most frequently-used commands is LOAD, SAVE, GOTO, SEARCH, BACKUP and erasing. He is apparently also having problems getting the Qflash RAM disk EPROM version to work.

QL Turbo Quill offers users a means of speeding Quills cursor handling — its more serious shortcoming. The 10 percent quoted from the review was for an average speed increase but was considerably greater for some operations than others and well worth having.

Athene will soon be releasing a faster Quill modifier, *Turbo + Quill*.

File-handling considerations are a different problem. The principal difference between nominal versions 2.00 and 2.30 Quill is a difference in file handling, most notably the SAVE time. For document lengths smaller than 32K, Quill version 2.00 had much to be said for it but exceeding the 32K limit almost invariably failed to SAVE a usable document. Psion was compelled to supply a patch to correct what amounted to a bug.

The time required for file-handling for large documents — more than 2,000 words or so — is common to almost every dedicated word processor available. I prefer a correct SAVE to a fast one but if this is unacceptable, why not consider using *The Editor*?

If you have a RAM disc, why not configure your Quill to default to ram 1 for its data device?

If the option to quit Quill rather than the usual reset is chosen, adding two groups of lines to the Quill boot will do the transfer work automatically. If you are using a standard RAM disc, at the beginning of the Quill boot add the following at the:

1 FORMAT ram1 — n (where *n* is the required number of sectors).

Dynamic RAM discs have varying formatting requirements, so this line may need adapting to particular types of RAM disc. At the end of the Quill boot program, add:

```
300 DIR ram1 —
310 INPUT/ "Name of file to
    transfer? ";filename$
320 DELETE 'flp2 — ' & filename$
330 COPY 'ram1 — ' & filename$
    TO 'flp2 — ' & filename$
```

Those lines will be executed only when you quit Quill. This could be improved to include a repeat loop for multiple files, with a quit option, once all the files were transferred to a drive.

If you have a toolkit supporting wildcard commands, you could use:

320 WCOPY 'ram1 — ' & filename,'flp2 — ' & filename

That has the advantage that existing files on a drive are updated and any number of files will be copied from RAM disc to the specified drive.

In common with the majority of EPROM add-ons, the Qflash RAM disc must be initialised prior to use. The procedure for doing so is detailed in the documentation; type-in the SuperBasic extension "QFLASH" before booting Quill, or add the "QFLASH" to the Quill boot program.

THE PROGS

If you have a program that is worthy of consideration, send it to 'The Progs', Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG. We pay for everything published at the usual page rates — £80 per thousand words.

The Progs is a very popular section of *Sinclair QL World* and has featured some excellent programs, the best of which are still available through Microdrive Exchange. In addition to continuing The Progs section, we are expanding the programs available on Microdrive Exchange, giving you even greater scope for marketing your programs. It also enables us to offer programs which are far too long to be printed in the magazine.

We have been sent hundreds of programs in the last few months, so do not be too surprised if you have heard nothing. We are now working through the backlog and you should receive some form of confirmation that your program has been reviewed in the next few weeks. If that is not the case you may like to consider re-submitting your program.

Others may not have considered submitting programs because of their length. If that is the case, we are now considering programs of any length for Microdrive Exchange, so let us see them.

If you have written a program and would like to have it published in The Progs, or sold through Microdrive Exchange, send it to The Progs, Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG.

There are a number of items you should try to include. We will need a copy of the program on Microdrive cartridge, with a Quill document containing any instructions necessary to run the program. You should include a printout of the Quill document and, if possible, a 50-column listing of the program. Please do not forget to include your name, address and, if possible, telephone number, specifying when you will be available on that number. Enclose a SAE if you would like your cartridge returned in the event of your program being unsuitable for submission.

256K RAM

In some cases the programs we receive have minimum requirements, such as 256K RAM and so on. If that is the case, state that clearly on the covering letter. It would not be the first time a program of this kind had been returned because it did not work on an unexpanded machine.

If you are sending a machine code program you should also include a Basic hex loader in addition to the object code. You can use the loader from our DIY Toolkit series rather than having to write your own. If you are sending a utility, please include a fully-working demonstration of how it works.

Finally, it would be helpful if you could state whether you are willing for the program to appear in The Progs, Microdrive Exchange, or both.

With our new system, normally you will hear from us in less than two months from the date of submission. Your program will be evaluated and you will receive one of two letters. If we are interested in publishing the program, you will receive a letter to that effect and a small form asking whether you are willing to have your program featured in The Progs or Microdrive Exchange and confirming the rates.

Alternatively, if your program is unsuitable, you will receive a letter explaining the reasons for rejection and suggestions for possible improvement. We apologise that the explanations are somewhat brief but we receive far too many programs to be able to spend any length of time on each of them.

Payment

We pay between £30 and £50 per page for programs printed in The Progs section. The amount depends on page layout. Programs sold through Microdrive Exchange earn their authors 25 percent of the selling price. It can be lucrative, with the most popular programs selling many hundreds of copies.

In some cases programs will be printed initially in the magazine, then sold through Microdrive Exchange, possibly in an extended form. In those cases, we pay half the normal page rate for the printed listing and the full 25 percent on Microdrive Exchange.

The quality of programs submitted to *QL World* has always been relatively high, reflecting the competence of many QL owners. In general, we are looking for well-produced, original ideas. Look through a few of the back issues to see the type of program we prefer.

The key

Originality is the key. We are not particularly interested in yet another graph plotting program, yet another bomb dropping game, programs to solve simultaneous equations, play battleships, and so on. Programs are not considered original for the QL if they have been printed dozens of times for other machines. This does not mean that we are not interested in seeing card games, arcade games and such, but they must be of exceptional quality.

In general, bear in mind that somebody will either spend a fair amount of their precious time typing-in your program from The Progs, or spending some of their hard-earned cash buying it from Microdrive Exchange. The program must be worth it.

PROGS

```
1000 REMark                    PICTURE PUZZLE
1010 REMark                    BY K.M.CAMERON
```

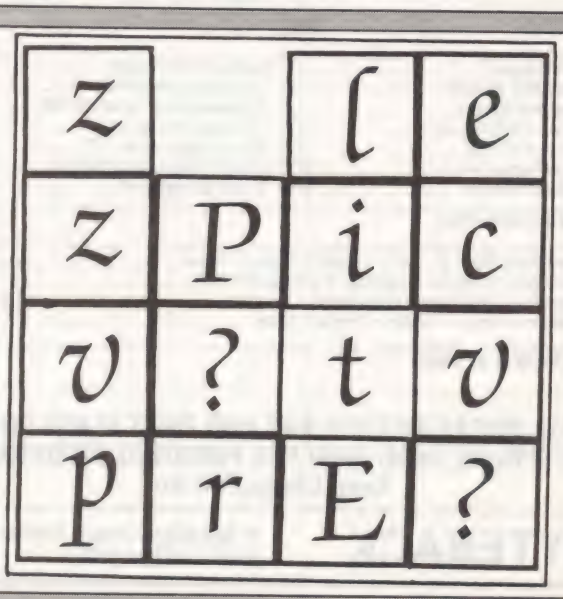
```
100 REMark                     PONTOON version I
110 REMark                     Copyright Huw Pendry 1986
```

PICTURE PUZZLE by KENNETH CAMERON

Picture Puzzle is a one-player game in which a picture is scrambled on the screen. The object is to unscramble it in as few moves as possible. It is done in a similar manner to the conventional sliding block puzzles, where a block is slid into an adjacent blank space, thus creating a new blank space, and so on.

The game uses an 8 x 8 grid of sliding blocks which can either be numbered or can load a graphic screen from Microdrive. The game can be stopped at any time by pressing the 'S' key.

```
1000 REMark PICTURE PUZZLE
1010 REMark BY K.M.CAMERON
1020 MODE 8
1030 OPEN#1,CON_512X256A0X0_100
1040 PAPER 0:INK 7:FLASH 0:OVER 0:CLS
1050 CSIZE 1,1
1060 AT 1,8:PRINT "PICTURE PUZZLE"
1070 CSIZE 1,0:AT 4,4:PRINT "BY KENNETH CAMERON 19
86"
1080 WINDOW 448,150,32,70
1090 CSIZE 0,0
1100 PRINT"A PICTURE WILL BE DIVIDED INTO 64PA
RTS,THEN SCRAMBLED USING THE CURSORKEYS AND MOVI
NG ONE PIECE AT A TIMEYOU MUST RESTORE THE PICTURE
.       THE SCRAMBLING WILL STOP WHEN YOUPRES
S THE SPACE BAR.PRESS 'S' TO EXITGAME."
1110 INPUT \"DO YOU WANT TO USE THE NUMBER GRID OR
LOAD A PICTURE FROM MICRO DRIVE,      (G or P):";N$
1120 IF N$=="G" OR N$=="P" THEN N$=N$:ELSE N$="G"
1130 IF N$=="G" THEN GRID:GO TO 1210
1140 PRINT\"PLACE CARTRIDGE IN MICRODRIVE 1,"
1150 INPUT\"WHAT IS IT CALLED:";T$
1160 IF T$="" THEN GRID:GO TO 1210
1170 INPUT \"4 OR 8 COLOURS:";C$
1180 IF C$<>"4" AND C$<>"8" THEN C$="8"
1190 MODE C$:WINDOW 512,256,0,0:CLS
1200 LBYTES "MDV1_"&T$,131072
1210 SCRAMBLE
1220 PLAY
1230 RUN
1240 DEFine PROCedure SCRAMBLE
1250 A$="":B$=""
1260 OPEN#3,SCR_:PAPER#3,0
1270 FOR L=0 TO 63:A$=A$&CHR$(32+L):B$=B$&CHR$(32+
L):NEXT L
1280 P=63:M=0
1290 IF INKEY$(0)=" " THEN RETurn
1300 D$=CHR$(192+8*RND(0 TO 3))
1310 SHIFT D$,2
1320 GO TO 1290
1330 END DEFine
1340 DEFine PROCedure SHIFT (SP$,SP)
1350 FLG=0
1360 IF SP$=CHR$(192) AND (P MOD 8)=0 THEN RETurn
1370 IF SP$=CHR$(200) AND (P MOD 8)=7 THEN RETurn
1380 IF SP$=CHR$(208) AND (P DIV 8)=0 THEN RETurn
1390 IF SP$=CHR$(216) AND (P DIV 8)=7 THEN RETurn
1400 SP2=CODE(SP$)
1410 SELect ON SP2
1420 =192:SPW3=128:SPW4=32
1430 SPW1=64*((P MOD 8)-1)
1440 SPW2=32*(P DIV 8)
1450 =208:SPW3=64:SPW4=64
1460 SPW1=64*(P MOD 8)
1470 SPW2=32*((P DIV 8)-1)
1480 =200:SPW3=128:SPW4=32
1490 SPW1=64*(P MOD 8)
1500 SPW2=32*(P DIV 8)
1510 =216:SPW3=64:SPW4=64
1520 SPW1=64*(P MOD 8)
1530 SPW2=32*(P DIV 8)
1540 END SELect
1550 WINDOW#3,SPW3,SPW4,SPW1,SPW2
1560 PAPER#3,2
1570 IF SP$=CHR$(192) AND SP=2 THEN PAN#3,64
1580 IF SP$=CHR$(192) AND SP=1 THEN FOR LL=1 TO 32
:PAN#3,2:NEXT LL
1590 IF SP$=CHR$(200) AND SP=2 THEN PAN#3,-64
1600 IF SP$=CHR$(200) AND SP=1 THEN FOR LL=1 TO 32
:PAN#3,-2:NEXT LL
1610 IF SP$=CHR$(208) AND SP=2 THEN SCROLL#3,32
1620 IF SP$=CHR$(208) AND SP=1 THEN FOR LL=1 TO 32
:SCROLL#3,1:NEXT LL
1630 IF SP$=CHR$(216) AND SP=2 THEN SCROLL#3,-32
1640 IF SP$=CHR$(216) AND SP=1 THEN FOR LL=1 TO 32
:SCROLL#3,-1:NEXT LL
1650 IF SP$=CHR$(192) THEN A$(P+1)=A$(P):A$(P)=CHR
$(95):P=P-1
1660 IF SP$=CHR$(200) THEN A$(P+1)=A$(P+2):A$(P+2)
=CHR$(95):P=P+1
1670 IF SP$=CHR$(208) THEN A$(P+1)=A$(P-7):A$(P-7)
=CHR$(95):P=P-8
1680 IF SP$=CHR$(216) THEN A$(P+1)=A$(P+9):A$(P+9)
=CHR$(95):P=P+8
1690 FLG=1
1700 END DEFine
1710 DEFine PROCedure PLAY
1720 MVS=0
1730 D$=INKEY$(-1)
1740 IF D$=="S" THEN RETurn
1750 IF D$<>CHR$(192) AND D$<>CHR$(200) AND D$<>CH
R$(208) AND D$<>CHR$(216) THEN GO TO 1730
1760 SHIFT D$,1
1770 MVS=MVS+FLG
1780 IF A$<>B$ THEN GO TO 1730
1790 MODE 8
1800 WINDOW 512,256,0,0
1810 CSIZE 1,1
1820 CLS
1830 AT 5,0:PRINT " YOU HAVE COMPLETED THE PUZZLE,
  NUMBER OF MOVES TAKEN:";MVS
1840 FOR L= 1 TO 1000:NEXT L:PAUSE
1850 END DEFine
1860 DEFine PROCedure GRID
1870 MODE 8:OPEN#3,SCR_
1880 CSIZE#3,0,1
1890 FOR L=0 TO 63
1900 WINDOW#3,64,32,64*(L MOD 8),32*(L DIV 8)
1910 BORDER#3,2,7:PAPER#3,3:INK#3,7:CLS#3
1920 IF L<9 THEN CURSOR#3,20,5:ELSE CURSOR#3,15,5
1930 IF L=63 THEN CLS#3:ELSE PRINT#3,L+1
1940 NEXT L
1950 END DEFine
```



CAMBRIDGE SYSTEMS TECHNOLOGY

24 Green Street, Stevenage, Herts SG1 3DS
Telephone: Stevenage (0438) 352150

THOR

The Thor Computer System is a professional business machine designed with the user and his future requirements in mind. Cambridge Systems Technology have developed several models making the Thor extremely versatilej: the single NEC 3.5in. floppy version with or without a 20M SCSI Winchester in addition to the dual floppy model packaged in a stylish metal case. The Thor is equipped with 640K RAM, parallel and serial printer ports, battery-backed clock and a separate IBM style (PC-AT) keyboard. Supplied free with the Thor is a specially commissioned version of the award winning Psion Xchange(*) software suite and a comprehensive manual. Special features of the Thor include multitasking at a single key-stroke and enhanced screen windowing representing excellent value for money.

THOR 20

The Thor 20 Computer System is the newest development from Cambridge Systems Technology, the very latest in high-speed processing. Based on the Motorola MC68020 processor, the Thor 20 delivers on average three times the computing power of the Thor. It is available with a choice of two clock speeds: 12.5 MHz (standard) or 16.7 MHz. The Thor 20 package includes a suite of development software comprising a specially commissioned macro assembler by Talent Computer Systems and a linker by GST in addition to the Psion Xchange(*) business software together with full supporting documentation. The Thor 20 Computer System provides a substantially higher performance than the Thor at a very cost-effective price.

THOR 21

The Thor 21 Computer System is designed for 'number crunching' applications. Based on the 68020 processor and additionally incorporating the MC68881 floating point coprocessor, the performance of floating point operations are dramatically improved — taking on 1% of the time taken without the coprocessor. This system is essential for a wide range of scientific and engineering applications and only costs an additional £201.25 (inc VAT).

QDisc Interface

The best-selling floppy disk interface is fitted with a 16K EPROM containing many 'Toolkit' extensions, and CST's Ram Drive 2. It may be used with most 3.5 or 5.25 floppy disc drives. CST's own twin slimline double sided 80 track 3.5 units being exceptional value for money, with 720K of formatted storage per drive. The Toolkit provides a wide range of SuperBASIC commands and functions designed to improve access to the powerful facilities of the QL without the need for machine-code programming. Job control is made easier, files can be used for random access, alternative character sets can be produced, 'wild cards' can be used in file operations, etc.

RAM Drive

The Ram Drive device driver allows free memory to be used as though it were a very high speed disc, in fact the fastest such device when used with the RAM-plus. Ideally used for the storage of temprary results, or multiple screen images for animated displays, it also eases the copying of files in single disc systems. The Ram Drive can only use memory which is free, so the full advantage is only felt if the QL is equipped with additional memory. Built into QDisc 4 and Thor, the Ram Drive is also available on 3.5in. and 5.25in. floppy disc.

RAM Plus

The CST RAM-plus unit expands the available memory of the QL to the limit of 640K. Using high grade 256K memory devices, this unit is the only one which offers the high performance of no wait-state operation. Housed in a rugged metal case, the RAM-plus unit has an expansion slot which duplicates the QL's, allowing any other CST peripheral to be used. Among the advantages derived from using the RAM-plus are the performance improvements of software and storage devices, and the ability to multitask several programs at once.

SCSI Interface

CST's Interface for Rodime compatable Winchesters handles up to 8 SCSI devices and is complete with floppy disc interface. Using enhanced QDISC software, it supports heirarchical directories, easing file management; with well over 1000 files being possible, this is absolutely essential. A Data Management Utility is provided which speeds up backups by only copying recently modified files.

Q448 Interface

The Q-488 provides comprehensive yet simple access to the IEEE 488 Instrument Bus for the Thor and QL. Developed with IEEE specialists Procyon Research Ltd, the Q-488 interfaces to equipment directly from SuperBASIC and other languages and provides commands for low level bus control and even built-in bus analysis.

Please supply:-	UK inc VAT		Overseas	
Qdisc Interface 4 (3.5in. util disc(	£79.95		£72.70	
Qdisc Interface 4 (5.25in. util. disc)	£79.95		£72.80	
QEP-III Eprom programmer (QL/THOR)	£129.95		£113.00	
RAM-plus 512K QL memory	£139.95		£125.20	
CST Dual 3.5in. cased floppy discs	£219.95		£200.40	
CST Q-488 GPIB instrument interface	£224.25		£198.40	
CST QDISC SCSI interface	£230.00		£203.40	
Qdisc 4 + dual 3.5in drives	£275.00		£249.40	
Qdisc 4, RAM-plus + dual 3.5in. discs	£405.00		£363.60	
3.5in Utility disc inc. Ram Drive 2	£10.00		£10.00	
5.25in. Utiity disc inc. Ram Drive 2	£10.00		£10.00	
Eprom V1.16 for issue 2/3 Qdisc	£15.00		£15.00	
Eprom V1.19 for issue 4 QDisc	£15.00		£15.00	
Thor 1F (Single floppy)	£688.85		£620.00	
Thor FF (Dual floppy)	£803.85		£720.00	
Thor WF (Winchester + floppy)	£1608.85		£1420.00	
Thor 20 1F (Single floppy)	£1292.60		£1179.00	
Thor 20 FF (Dual floppy)	£1407.60		£1279.00	
Thor 20 WF (Winchester + floppy)	£2212.60		£1979.00	

Available as an upgrade for existing Thor owners.
For floating point option contact CST.

Export administration	£5.00	
Airmail outside Europe	£5.00	

Prices are inclusive of carriage
CST reserve the right to alter prices and specifications without prior notice

Please complete in full:

Name .....

Address .....

.....

.....

Post Code..... Telephone .....

I enclose a cheque/PO of £ .....

Please deduct my Access/Mastercard/Eurocard/Diners Club a/c

Card No.

Expiry Date .....

Signature .....

PONTOON by H.R. PENDRY

This is the classic game of *Pontoon*. It features proper card graphics, changing banker — on royal pontoon — full betting, buying, twisting, sticking and complete scoring, including five-card tricks and so on.

```
100 REMark                    PONTOON version 1
110 REMark                Copyright Huw Pendry 1986
120 MODE 4
130 WINDOW 448,240,32,16
140 SCALE 256,0,0
150 DIM money(2),card_tot(2),total(2,2),hand(2,5),
suit$(4),numb$(13),str_table(11)
160 set_chars
170 open_pack
180 RESTORE 200
190 FOR i=1 TO 11:READ str_table(i)
200 DATA 4,7,8,9,5,6,3,2,10,1,11
210 REPeat match_loop
220   PAPER 4:INK 0:CLS
230   AT 3,3
240   CSIZE 2,0
250   PRINT "Please enter your name ";
260   STRIP 7
270   POKE 163976,0
280   INPUT name$
290   POKE 163976,1
300   banker=0:stake=0
310   FOR j=1 TO 2:FOR i=1 TO 5:hand(j,i)=0:END FOR
 i:END FOR j
320   money(1)=250 : money(2)=250
330   INK 0:STRIP 7:CLS
340   CSIZE 2,0
350   AT 20,17:PRINT name$
360   AT 1,17:PRINT"Computer"
370   out_head
380   out_values
390   REPeat game_loop
400    card_tot(1)=0 : card_tot(2)=0
410     stake=0
420     royal_pontoon=0
430     shuffle_pack
440     pointer=1
450    BLOCK 186,53,178,28,4
460    BLOCK 186,53,178,140,4
470    STRIP 4
480    AT 11,10:PRINT"       "
490    AT 9,10:PRINT"        "
500    AT 5,10:PRINT"         "
510    AT 16,10:PRINT"         "
520    AT 5,38:PRINT"                "
530    AT 16,38:PRINT"                "
540     twist 1,1
550     buy 2,1
560    IF banker=1 THEN
570     comp_choice
580     IF total(2,1)<=21 AND royal_pontoon=0 THEN
player_choice
590     IF total(1,1)<=21 THEN IF total(2,1)<=21 TH
EN twist 2,0:ELSE out_tot 2
600    ELSE
610     player_choice
620     IF total(1,1)<=21 THEN comp_bank
630    END IF
640    update_score
650    STRIP 4:AT 10,25:PRINT"      "
660    IF money(1)=0 OR money(2)=0 THEN EXIT game_l
oop
670   END REPeat game_loop
680   AT 10,23
690   IF money(1)=0 THEN PRINT"Too Bad, You lose":E
LSE PRINT"Well done, You win!"
700   AT 11,18:PRINT"Do you want another game (Y/N)
?"
710   REPeat yn_loop
720    a$=INKEY$
730    IF a$="Y" OR a$="N" THEN EXIT yn_loop
740   END REPeat yn_loop
750   IF a$="N" THEN EXIT match_loop
760 END REPeat match_loop
770 STOP
780 :
790 DEFine PROCedure player_choice
800 INK 7:STRIP 4;2,3
810 AT 10,20
820 IF NOT banker THEN PRINT"(B)uy , (T)wist":ELSE
 PRINT "    (T)wist    "
830 AT 11,20:PRINT"   or (S)tick  "
840 REPeat act_loop
850   REPeat in_loop
860    a$=INKEY$(-1)
870    IF a$="S" OR a$="B" OR a$="T" THEN EXIT in_l
oop
880   END REPeat in_loop
890   IF a$="B" AND NOT banker THEN player_buy
900   IF a$="T" THEN twist 1,1
910   IF NOT banker THEN check_royal 1
920   IF (a$="S" AND (total(1,1)>=16 OR total(1,2)>
=16)) OR total(1,1)>21 OR card_tot(1)=5 THEN EXIT
act_loop
930 END REPeat act_loop
940 IF card_tot(1)=5 AND total(1,1)<22 : AT 16,38:
PRINT"FIVE CARD TRICK"
950 BLOCK 120,20,160,100,4
960 END DEFine
970 :
980 DEFine PROCedure check_royal (wx)
990 LOCal a
1000 IF total(wx,2)=21 AND card_tot(wx)=2 THEN
1010  a=((hand(wx,1)-1) MOD 13)+1
1020   IF a=1 THEN a=((hand(wx,2)-1) MOD 13)+1
1030   IF a>10 THEN royal_pontoon=1:a$="S"
1040 END IF
1050 END DEFine
1060 :
1070 DEFine PROCedure player_buy
1080 LOCal bet
1090 REPeat mon_loop
1100   STRIP 4:AT 11,10:PRINT"     "
1110   STRIP 7:INK 0
1120   AT 11,10:INPUT bet
1130   IF bet<=money(1) AND bet<=money(2) AND bet<5
1 THEN EXIT mon_loop
1140 END REPeat mon_loop
1150 money(1)=money(1)-bet
1160 money(2)=money(2)-bet
1170 stake=stake+2*bet
1180 out_values
1190 twist 1,1
1200 END DEFine
1210 :
1220 DEFine PROCedure comp_bank
1230 IF royal_pontoon=1 THEN RETurn
1240 twist 2,0
1250 a$=""
1260 REPeat i_loop
1270   IF total(2,2)<>0 THEN
1280    IF total(2,2)<16 THEN comp_twist:ELSE gambl
e total(2,2),0
1290   ELSE
1300    IF total(2,1)<16 THEN comp_twist 2,1:ELSE g
amble total(2,1),0
1310   END IF
```

```
1320  IF a$<>"S" THEN out_tot 2
1330  IF total(2,1)>21 THEN EXIT i_loop
1340  INK 0:STRIP 7
1350  IF card_tot(2)=5 THEN a$="S":AT 5,38:PRINT"F
IVE CARD TRICK"
1360  INK 7:STRIP 2
1370  IF a$="S" THEN AT 10,25:PRINT"STICK":wait:EX
IT i_loop
1380 END REPeat i_loop
1390 END DEFine
1400 :
1410 DEFine PROCedure comp_twist
1420 INK 7:STRIP 2
1430 AT 10,25:PRINT"TWIST"
1440 twist 2,1
1450 STRIP 4
1460 AT 10,25:PRINT"      "
1470 END DEFine
1480 :
1490 DEFine PROCedure gamble (score,switch)
1500 LOCal r
1510 IF score=21 THEN a$="S":RETurn
1520 r=RND(0 TO 21)
1530 IF r>score THEN comp_twist:RETurn
1540 IF r=score AND switch=1 THEN comp_buy r*3:ELS
E a$="S"
1550 END DEFine
1560 :
1570 DEFine PROCedure comp_choice
1580 a$=""
1590 REPeat o_loop
1600  IF total(2,2)<>0 THEN
1610   IF total(2,2)<16 THEN comp_buy (RND(1 TO to
tal(2,2)))*3:ELSE gamble total(2,2),1
1620  ELSE
1630   IF total(2,1)<16 THEN evaluate:ELSE gamble
total(2,1),1
1640  END IF
1650  check_royal 2
1660  IF total(2,1)>21 THEN EXIT o_loop
1670  INK 0:STRIP 7
1680  IF card_tot(2)=5 THEN a$="S":AT 5,38:PRINT"F
IVE CARD TRICK"
1690  INK 7:STRIP 2
1700  IF a$="S" THEN AT 10,25:PRINT"STICK":wait:EX
IT o_loop
1710 END REPeat o_loop
1720 END DEFine
1730 :
1740 DEFine PROCedure wait
1750 LOCal i
1760 FOR i=1 TO 500:END FOR i
1770 END DEFine
1780 :
1790 DEFine PROCedure evaluate
1800 LOCal k,strength
1810 IF total(2,1)>11 THEN
1820  comp_twist
1830 ELSE
1840  FOR k=1 TO 11:IF str_table(k)=total(2,1) THE
N strength=k
1850  comp_buy RND(1 TO strength)*5
1860 END IF
1870 END DEFine
1880 :
1890 DEFine PROCedure comp_buy (amount)
1900 STRIP 2:INK 7
1910 AT 10,25:PRINT" BUY "
1920 IF amount>50 THEN amount=50
1930 IF amount>money(1) THEN amount=money(1)
1940 IF amount>money(2) THEN amount=money(2)
1950 money(1)=money(1)-amount
1960 money(2)=money(2)-amount
1970 stake=stake+2*amount
1980 STRIP 4
1990 AT 9,10:PRINT"     "
2000 STRIP 7:INK 0:AT 9,10:PRINT amount
2010 out_values
2020 buy 2,1
2030 STRIP 4:AT 10,25:PRINT"      "
2040 END DEFine
2050 :
2060 DEFine PROCedure update_score
2070 LOCal a,b,d,e
2080 IF royal_pontoon=1 THEN
2090  banker=NOT(banker)
2100  out_head
2110  CSIZE 2,1:INK 0:STRIP 4
2120  AT 5,10
2130  IF banker=1 THEN PRINT"YOU GET THE BANK!!":E
LSE PRINT"I GET THE BANK"
2140  IF banker=1 THEN music 1:win 3:ELSE music 4:
win 4
2150  CSIZE 2,1:INK 0:STRIP 4
2160  PAUSE 50:AT 5,10:PRINT FILL$(" ",18)
2170  CSIZE 1,0
2180 ELSE
2190  IF total(1;2)<>0 THEN a=total(1,2):ELSE a=to
tal(1,1)
2200  IF a>21 THEN a=0
2210  IF total(2,2)<>0 THEN b=total(2,2):ELSE b=to
tal(2,1)
2220  IF b>21 THEN b=0
2230  d=card_tot(1):e=card_tot(2)
2240  IF d=2 AND a=21 THEN a=50
2250  IF e=2 AND b=21 THEN b=50
2260  IF d=5 AND e<>5 AND a<>0 THEN a=100
2270  IF e=5 AND d<>5 AND b<>0 THEN b=100
2280  IF a>b OR (a=b AND banker=1) THEN win 1:ELSE
 win 2
2290 END IF
2300 END DEFine
2310 :
2320 DEFine PROCedure win (z)
2330 IF z=1 THEN music 2
2340 IF z=2 THEN music 3
2350 IF z>2 THEN z=z-2
2360 money(z)=money(z)+stake
2370 IF stake<>0 THEN stake=0:out_values
2380 END DEFine
2390 :
2400 DEFine PROCedure music (lin_no)
2410 LOCal no_notes,i,a,b,c
2420 RESTORE 2450+(lin_no*10)
2430 READ no_notes
2440 FOR i=1 TO no_notes:READ a,b,c:BEEP a,b:PAUSE
 c
2450 BEEP
2460 DATA 4,1000,20,5,1000,20,5,1000,20,5,2000,10,
10
2470 DATA 3,0,20,5,0,30,5,0,20,5
2480 DATA 2,3000,100,10,5000,200,15
2490 DATA 3,3000,100,10,3000,150,10,5000,200,15
2500 END DEFine
2510 :
2520 DEFine PROCedure twist (x,no_cards)
2530 LOCal down,ts,i,a,flag
2540 IF x=1 THEN down=50:a=143:ELSE down=170:a=31
2550 IF no_cards=0 THEN flag=1:no_cards=card_tot(x
):ELSE flag=0
2560 FOR i=1 TO no_cards
2570  IF flag THEN card_tot(x)=i-1
2580  print_cards 154+(card_tot(x)*10),down,1
2590  IF NOT flag THEN deal x:ELSE tc=hand(x,i)
2600  CSIZE 1,0
2610  ts=((tc-1) DIV 13)+1
2620  IF ts>=3 THEN INK 2:ELSE INK 0
2630  STRIP 7
2640  IF flag THEN card_tot(x)=i
2650  CURSOR 168+(card_tot(x)*12.7),a
2660  PRINT numb$(((tc-1) MOD 13)+1)
2670  CURSOR 168+(card_tot(x)*12.7),a+9
2680  PRINT suit$(ts)
2690  IF flag THEN calc_tot x:out_tot x
2700 END FOR i
2710 calc_tot x
2720 END DEFine
2730 :
2740 DEFine PROCedure buy (x,no_cards)
2750 LOCal i,down,b
2760 IF x=1 THEN down=50 : b=146 : ELSE down=170 :
 b=33
2770 FOR i=1 TO no_cards
2780  print_cards 154+(card_tot(x)*10),down,1
2790  deal x
```

```
2800 END FOR i
2810 calc_tot x
2820 BLOCK 28,42,175+(card_tot(x)*12.7),b,2,7,3
2830 END DEFine
2840 :
2850 DEFine PROCedure deal (wp)
2860 card_tot(wp)=card_tot(wp)+1
2870 tc=pack(pointer)
2880 hand(wp,card_tot(wp))=tc
2890 pointer=pointer+1
2900 END DEFine
2910 :
2920 DEFine PROCedure calc_tot (w)
2930 LOCal ace,f_tot,i,card_val
2940 ace=0 : f_tot=0
2950 FOR i=1 TO card_tot(w)
2960  card_val=((hand(w,i)-1) MOD 13)+1
2970  IF card_val>10 THEN card_val=10
2980  f_tot=f_tot+card_val
2990  IF card_val=1 THEN ace=1
3000 END FOR i
3010 total(w,1)=f_tot
3020 IF ace<>0 AND f_tot<=11 THEN total(w,2)=f_tot
+10:ELSE total(w,2)=0
3030 IF w=1 THEN out_tot 1
3040 END DEFine
3050 :
3060 DEFine PROCedure out_tot (wx)
3070 LOCal h
3080 STRIP 4
3090 IF wx=1 THEN h=16:ELSE h=5
3100 AT h,10:PRINT FILL$(" ",8)
3110 INK 0:STRIP 7
3120 AT h,10:PRINT total(wx,1);
3130 IF total(wx,1)>21 THEN PRINT" BUST"
3140 IF total(wx,2)<>0 THEN PRINT" or"!total(wx,2)
3150 END DEFine
3160 :
3170 DEFine PROCedure left_side (xco,yco)
3180 LINE xco,yco
3190 LINE_R TO -10,0 TO -3,3 TO 0,50 TO 3,3 TO 10,
0
3200 END DEFine
3210 :
3220 DEFine PROCedure right_side (xco,yco)
3230 LINE xco,yco
3240 LINE_R TO 20,0 TO 3,3 TO 0,50 TO -3,3 TO -21,
0
3250 END DEFine
3260 :
3270 DEFine PROCedure print_cards (across,down,no_
cards)
3280 INK 7
3290 FILL 1
3300 draw_cards across,down,no_cards
3310 INK 0
3320 FILL 0
3330 draw_cards across,down,no_cards
3340 END DEFine
3350 :
3360 DEFine PROCedure draw_cards (across,down,no_c
ards)
3370 LOCal i
3380 FOR i=across TO (no_cards-1)*10+across STEP 1
0
3390 left_side i,down
3400 END FOR i
3410 right_side i,down
3420 END DEFine
3430 :
3440 DEFine PROCedure out_head
3450 CSIZE 1,0
3450 CSIZE 1,0
3460 INK 3 : STRIP 7
3470 AT 2,8
3480 IF banker=0 THEN PRINT"BANKER":ELSE PRINT"PUN
TER"
3490 AT 19,8
3500 IF banker=1 THEN PRINT"BANKER":ELSE PRINT"PUN
TER"
3510 INK 0:STRIP 4
3520 AT 4,2:PRINT"MONEY `"
3530 AT 17,2:PRINT"MONEY `"
3540 AT 5,2:PRINT"TOTAL ="
3550 AT 16,2:PRINT"TOTAL ="
3560 AT 9,2:PRINT"BET    `"
3570 AT 10,2:PRINT"STAKE `"
3580 AT 11,2:PRINT"BET    `"
3590 END DEFine
3600 :
3610 DEFine PROCedure out_values
3620 INK 0:STRIP 4:CSIZE 1,0
3630 AT 4,10:PRINT"    "
3640 AT 17,10:PRINT"    "
3650 AT 10,10:PRINT"    "
3660 STRIP 7
3670 AT 4,10:PRINT money(2)
3680 AT 17,10:PRINT money(1)
3690 AT 10,10:PRINT stake
3700 END DEFine
3710 :
3720 DEFine PROCedure open_pack
3730 LOCal i
3740 DIM pack (52)
3750 FOR i=1 TO 52 : pack(i)=i
3760 END DEFine
3770 :
3780 DEFine PROCedure shuffle_pack
3790 LOCal j,a,b,z
3800 FOR j=1 TO 50
3810  a=RND(1 TO 52)
3820  b=RND(1 TO 52)
3830  z=pack(a)
3840  pack(a)=pack(b)
3850  pack(b)=z
3860 END FOR j
3790 LOCal j,a,b,z
3800 FOR j=1 TO 50
3810  a=RND(1 TO 52)
3820  b=RND(1 TO 52)
3830  z=pack(a)
3870 END DEFine
3880 :
3890 DEFine PROCedure set_chars
3900 LOCal i,byte
3910 st_add=RESPR(100)
3920 reg_a0=65537
3930 reg_a2=st_add+6
3940 RESTORE 4060
3950 FOR i=0 TO 61:READ byte:POKE st_add+i,byte
3960 CALL st_add,0,0,255,37,0,0,0,reg_a0,0,reg_a2
3970 FOR i=1 TO 4:suit$(i)=CHR$(i+127)
3980 numb$(1)=CHR$(132)
3990 FOR i=2 TO 9:numb$(i)=i
4000 numb$(10)=CHR$(133)
4010 numb$(11)="J"
4020 numb$(12)="Q"
4030 numb$(13)="K"
4040 END DEFine
4050 :
4060 REMark machine code - 6 bytes
4070 DATA 32,4,78,67,78,117
4080 :
4090 REMark data - 2 bytes
4100 DATA 128,5
4110 :
4120 REMark character patterns -
4130 REMark 9 bytes per char
4140 DATA 8,28,62,127,127,107,8,8,0
4150 DATA 28,28,8,107,127,107,8,8,0
4160 DATA 0,231,255,255,126,60,24,0,0
4170 DATA 8,28,62,127,62,28,8,0,0
4180 DATA 24,24,36,36,126,66,66,0,0
4190 DATA 76,82,82,82,82,82,76,0,0
```

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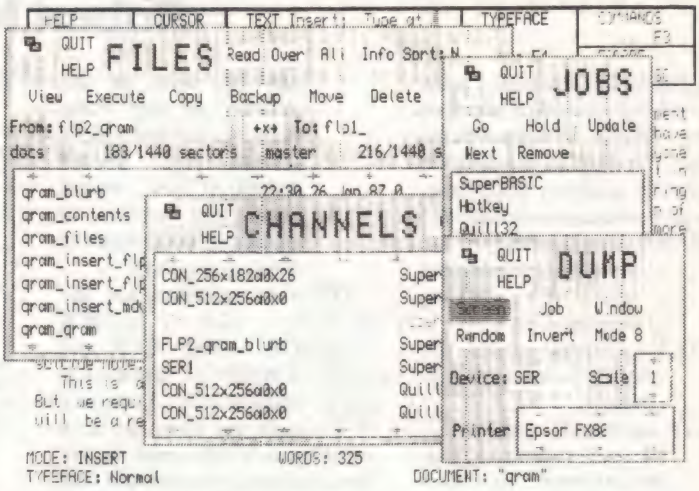

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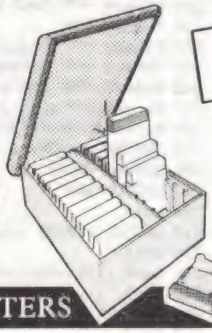

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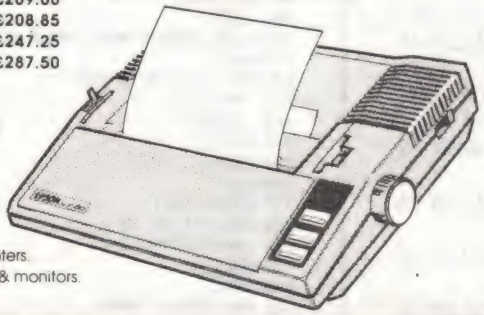

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PROGS

Program of the month

Video Effects Box 1

Robert Noble

The Video Effects Box 1 adds nine procedures and a function to SuperBasic. The procedures enable the user to manipulate screens in memory with ease. The procedures are as follows:

SCREEN (address) moves the screen at (address) into the display memory.

STORE (address) stores the display memory at (address).

SWAP (address1), (address2). Swaps the screen at (address1) with that at (address2).

UPSIDE Turns the displayed picture upside-down.

MIX (address). The same as SCREEN, except that the screen at (address) is Exclusive-ORed on to the screen. After MIXing a screen on to the display, MIX it again to leave the original picture as before.

BLOCK CLS (pattern), (speed). Clears the display by blanking one block of an 8 x 8 grid at a time. The speed can be anything from 1 to 32767, 1 being the fastest. The pattern selects the order in which the blocks are cleared — see below.

BLOCK CHANGE (address), (pattern), (speed). Basically the same as BLOCK CLS ecept that the display changes into the screen held at (address) instead of just clearing.

LINE CLS (pattern), (speed). A variation on the BLOCK commands where the screen clears one horizontal line at a time.

LINE CHANGE (address), (pattern), (speed). As BLOCK CHANGE but with horizontal lines instead of blocks.

The function is:

SCRN. SCRN returns the number 131072, which is the address of the display in memory. SCRN can be used as the address in any command to use the visible screen, e.g., SWAP 250000,SCRN would swap the screen at address 250000 with the displayed screen.

Different patterns for the BLOCK CLS, BLOCK CHANGE, LINE CLS and LINE CHANGE commands can be added easily. At the end of the code are three portions of 64 bytes which make up the three patterns you can use with the program as it is. Each byte represents a block or a line, depending on which commanc you use. Figure one shows how the bytes relate to the position of the blocks on the screen and figure two the position of the lines.

To add a new pattern you poke the numbers 0 to 63 into memory in the order you want the block/lines to change. The 64 bytes should be poked into memory directly after the code start address+978. If you wanted the BLOCK CLS command to clear the blocks in the order shown in figure three, you should use this program:

```
10 a=RESPR (978+64)
11 REMark reserve memory for
code & pattern
20 LEBYTES MDV1 Video
code,a
30 FOR l=0 to 63
40 READ n
50 POKE a+978+l,n
60 NEXT l
70 SBYTES MDV1 New code,
a,978+64
80 REMark Now comes the 64
bytes
100 DATA 0, 1, 2, 3, 4, 5, 6, 7
110 DATA 15,14,13,12,20,21,
22,30
120 DATA 29,28,27,19,11,10,
9,8
130 DATA 16,24,32,40,48,56,
57,49
140 DATA 41,33,25,17,18,26,
34,42
150 DATA 50,58,59,60,61,62,
54,46
160 DATA 45,53,52,51,43,35,
36,44
170 DATA 37,38,39,31,23,47,
55,63
```

The new pattern will be number 3, so try:

BLOCK CLS 3,10000

0	1	2	3	4	5	6	7
8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23
24	25	26	27	28	29	30	31
32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47
48	49	50	51	52	53	54	55
56	57	58	59	60	61	62	63

Figure 1

Line 1
Line 2
Line 3
↓ ↓
Line 61
Line 62
Line 63

Figure 2

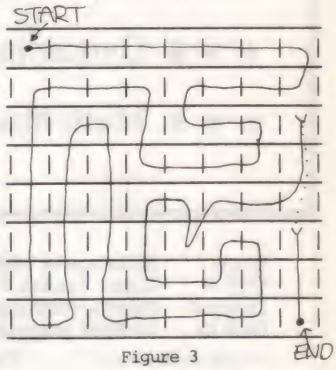

Figure 3

Listing 1.

```
100 REMark *** Demo program for Video Effects Box 1  ***
110 REMark ***           Robert Noble                ***
120 REMark *** Requires two screens on microdrive.   ***
130 REMark *** Filenames of screens held in line 150 ***
140 REMark *** Run BASIC_loader before this program  ***
150 screen1$="mdv1_scr1":screen2$="md1_scr2"
160 scr1=RESPR(32768):scr2=RESPR(32768)
170 LBYTES screen1$,scr1:LBYTES screen2$,scr2
180 REPeat demo
190 SCREEN scr1
200 wait
210 BLOCK_CHANGE scr2,RND(0 TO 2),10000
220 wait
230 LINE_CLS RND(0 TO 2),10000
240 wait
250 BLOCK_CHANGE scr1,RND(0 TO 2),5000
260 wait
270 MIX scr2
280 wait
290 MIX scr1
300 wait
310 LINE_CHANGE scr1,RND(0 TO 2),500
320 wait
330 FOR p=50 TO 1 STEP -3
340  PAUSE p
350  UPSIDE
360 NEXT p
370 wait
380 LIST
390 STORE scr1
400 FOR p=1 TO 10
410  SWAP SCRN,scr2
420 NEXT p
430 wait
440 END REPeat demo
450 DEFine PROCedure wait
460  PAUSE 100
470 END DEFine
```

Listing 2.

```
100 REMark *** BASIC LOADER FOR VIDEO EFFECTS BOX 1 ***
110 REMark ***            Robert Noble                ***
120 a=RESPR(978)
130 c=0
140 FOR z=1000 TO 1480 STEP 10
150  tot=0
160  FOR x=1 TO 10
170   READ p
180   tot=tot+p
190   POKE_W a+c,p
200   c=c+2
210  NEXT x
220  READ check:IF check<>tot THEN PRINT "ERROR IN LINE ";z:STOP
230 NEXT z
240 SBYTES mdv1_video_code,a,978
1000 DATA 17402,10,13432,272,20114,20085,9,110,1619,17234,90287
1010 DATA 17733,19968,142,1107,22337,20480,178,1363,21583,21061,125952
1020 DATA 212,1621,20563,18756,17664,244,845,18776,282,2370,81333
1030 DATA 19535,17227,24387,19539,378,3138,19535,17227,24387,18497,163850
1040 DATA 20039,17664,486,2124,18766,17759,17228,21248,558,2892,118764
1050 DATA 18766,17759,17224,16718,18245,0,1,630,1107,17234,107684
1060 DATA 19968,0,13432,280,20114,26144,28913,3139,1,26136,138127
1070 DATA 8822,-26624,8252,0,8191,8316,2,0,8409,20936,36304
1080 DATA -4,17024,20085,13432,280,20114,26146,28913,3139,2,129131
1090 DATA 26138,8310,-26624,8822,-26620,8252,0,8191,8720,8401,23590
1100 DATA 8897,20936,-8,17024,20085,13432,280,20114,26144,28913,155817
1110 DATA 3139,1,26136,8822,-26624,8316,2,0,8252,0,28044
1120 DATA 8191,8920,20936,-4,17024,20085,8316,2,0,8828,92298
1130 DATA 2,32640,12348,127,29215,9232,8401,8898,20937,-8,121792
1140 DATA -27652,0,256,20936,-20,17024,20085,13432,280,20114,64455
1150 DATA 26146,28913,3139,1,26138,8822,-26624,8252,0,8191,82978
1160 DATA 8316,2,0,8729,-19560,20936,-6,17024,20085,13432,68958
1170 DATA 280,20114,26210,28913,3139,2,26202,10806,-26624,10294,99336
1180 DATA -26620,28910,3204,0,32767,28232,-4787,16890,410,-11835,67171
1190 DATA 28735,17025,4632,5121,513,7,514,56,-5814,-5302,45487
1200 DATA -5815,-11710,12865,-11268,2,0,13884,31,17049,17049,32087
1210 DATA 17049,17049,-11524,112,20939,-14,12804,20937,-2,20936,98286
1220 DATA -58,17024,20085,13432,280,20114,26226,28913,3139,3,129158
1230 DATA 26350,9334,-26624,10806,-26620,10294,-26616,28910,3204,0,9038
1240 DATA 32767,28244,16890,300,-4787,-11835,28735,17025,4632,5121,117092
1250 DATA 513,7,514,56,-5814,-5302,-5815,-11710,8828,2,-18721
1260 DATA 0,30239,9138,4096,4096,9138,4100,4100,9138,4104,78149
1270 DATA 4104,9138,4108,4108,1601,128,20939,-30,12804,20937,77837
1280 DATA -2,20936,-70,17024,20085,13432,280,20114,26186,28913,146898
1290 DATA 3139,2,26178,10806,-26624,10294,-26620,28910,3204,0,29289
1300 DATA 32767,28208,-4787,16890,178,-11835,28735,17025,4632,-7863,103950
1310 DATA -7351,12865,-11268,2,0,13884,127,17049,20939,-4,46243
1320 DATA 12804,20937,-2,20936,-34,17024,20085,13432,280,20114,125576
1330 DATA 26192,28913,3139,3,26184,9334,-26624,10806,-26620,10294,61621
1340 DATA -26616,28910,3204,0,32767,28210,16890,92,-4787,-11835,66835
1350 DATA 28735,17025,4632,-7863,-7351,8828,2,0,30335,9138,83481
1360 DATA 4096,4096,22593,20939,-10,12804,20937,-2,20936,-36,106353
1370 DATA 17024,20085,8814,88,13432,282,29190,20114,23881,11593,144503
1380 DATA 88,15804,2066,-26624,15804,16384,-26622,15804,0,-26620,-13916
1390 DATA 30722,17024,20085,4644,12814,7713,13588,560,9737,8747,125634
1400 DATA 1071,15166,2840,1563,13369,10504,5660,5407,3097,9532,68209
1410 DATA 11537,263,6666,16168,5901,10040,10810,11779,13824,15621,102609
1420 DATA 14096,4908,7456,12595,8975,6940,9251,8730,4627,5141,82719
1430 DATA 7461,11564,11050,10529,6417,2314,2828,3342,5662,9774,70941
1440 DATA 13877,13363,12849,12328,8216,4104,1,515,1029,1543,67825
1450 DATA 3863,7975,12087,16190,15676,15162,14648,8,258,2320,88187
1460 DATA 6161,2563,1035,4633,8232,8474,4876,1286,3348,6946,47554
1470 DATA 10544,14385,10787,7189,3591,3862,7460,11058,14650,13100,96626
1480 DATA 9502,5919,9773,13371,15413,11815,12086,15678,14143,-24854,82846
```

```
        ;    ***************************
        ;    *                         *
        ;    *  Video Effects Box 1    *
        ;    *   1986 Robert Noble     *
        ;    *     June 1986           *
        ;    *                         *
        ;    ***************************

ERR_BP          EQU     -15
ERR_OR          EQU     -4
ERR_OV          EQU     -18
NO_OF_PATS      EQU     2
RET_FP          EQU     2
BV_CHRIX        EQU     $11A
BV_RIP          EQU     $58
CA_GTLIN        EQU     $118
BP_INIT         EQU     $110

DEFPROC LEA.L   PROCS,A1        ;initialize BASIC
        MOVE.W  BP_INIT,A2      ;procedures
        JSR     (A2)
        RTS

PROCS   DC.W    9               ;no. of procedures

        DC.W    MOV_SCR-*       ;offset to start of procedure
        DC.B    6               ;length of name
        DC.B    'SCREEN'        ;name bytes

        ALIGN                   ;keep on word boundary

        DC.W    SWP_SCR-*
        DC.B    4               ;same as above
        DC.B    'SWAP'

        ALIGN

        DC.W    STR_SCR-*
        DC.B    5
        DC.B    'STORE'

        ALIGN

        DC.W    UPSIDE-*
        DC.B    6
        DC.B    'UPSIDE'

        ALIGN

        DC.W    MIX-*
        DC.B    3
        DC.B    'MIX'

        ALIGN

        DC.W    BLK_CLS-*
        DC.B    9
        DC.B    'BLOCK_CLS'

        ALIGN

        DC.W    BLK_CHG-*
        DC.B    12
        DC.B    'BLOCK_CHANGE'

        ALIGN

        DC.W    LIN_CLS-*
        DC.B    8
        DC.B    'LINE_CLS'

        ALIGN

        DC.W    LIN_CHG-*
        DC.B    11
        DC.B    'LINE_CHANGE'

        ALIGN

        DC.W    0               ;end of procedures

        DC.W    1               ;no. of functions

        DC.W    SCR_VAL-*
        DC.B    4
        DC.B    'SCRN'

        ALIGN

        DC.W    0               ;end of functions

;code for SCREEN command

MOV_SCR MOVE.W  CA_GTLIN,A2     ;get argument
        JSR     (A2)            ;long int format
        BNE.S   EXIT1           ;exit if error
        MOVEQ   #ERR_BP,D0
        CMP.W   #1,D3           ;check there is one
        BNE.S   EXIT1           ;parameter
        MOVE.L  0(A6,A1.L),A1   ;get param. from stack
        MOVE.L  #8191,D0        ;loop, to transfer screen
        MOVE.L  #131072,A0      ;from address passed to
LOOP    MOVE.L  (A1)+,(A0)+     ;proc to screen RAM
        DBF     D0,LOOP

        CLR.L   D0              ;clear D0 - no errors
EXIT1   RTS                     ;return to BASIC

;code for SWAP command

SWP_SCR MOVE.W  CA_GTLIN,A2     ;get arguments
        JSR     (A2)            ;long int. format
        BNE.S   EXIT2           ;exit if error
        MOVEQ   #ERR_BP,D0
        CMP.W   #2,D3           ;should be two params.
        BNE.S   EXIT2           ;exit if not.
        MOVE.L  0(A6,A1.L),A0   ;get first address from stack
        MOVE.L  4(A6,A1.L),A1   ;get second   "      "    "
        MOVE.L  #8191,D0        ;loop through screen RAM
LOOP2   MOVE.L  (A0),D1         ;store value from first screen
        MOVE.L  (A1),(A0)+      ;put value from second into first
        MOVE.L  D1,(A1)+        ;put stored value in second screen
        DBF     D0,LOOP2        ;go back for next long word

        CLR.L   D0              ;no errors
EXIT2   RTS                     ;return

;code for STORE command

STR_SCR MOVE.W  CA_GTLIN,A2     ;get params.
        JSR     (A2)            ;as long integers
        BNE.S   EXIT3           ;error?
        MOVEQ   #ERR_BP,D0
        CMP.W   #1,D3           ;should be just one
        BNE.S   EXIT3           ;not one?
        MOVE.L  0(A6,A1.L),A1   ;take param. from stack
        MOVE.L  #131072,A0      ;A0 equals beginning of screen RAM
        MOVE.L  #8191,D0        ;loop through screen
LOOP3   MOVE.L  (A0)+,(A1)+     ;moving screen to supplied address
        DBF     D0,LOOP3        ;next

        CLR.L   D0              ;no error
EXIT3   RTS                     ;return

;code for UPSIDE command

UPSIDE  MOVE.L  #131072,A0      ;A0 equals beginning of first line of
        MOVE.L  #163712,A1      ;screen, A1 equals begin. of last line
        MOVE    #127,D0         ;loop from top to middle of screen
OLOOP4  MOVEQ   #31,D1          ;loop from left to right of line
LOOP4   MOVE.L  (A0),D2         ;swap data from top line
        MOVE.L  (A1),(A0)+      ;with that at the bottom
        MOVE.L  D2,(A1)+
        DBF     D1,LOOP4        ;do the rest of the line
        SUB.L   #256,A1         ;come up a line
        DBF     D0,OLOOP4       ;do the next line

        CLR.L   D0              ;no errors
EXIT4   RTS                     ;ret.

;code for MIX procedure

MIX     MOVE    CA_GTLIN,A2     ;get long integer
        JSR     (A2)            ;
        BNE.S   EXIT10          ;exit if an error
        MOVEQ   #ERR_BP,D0      ;error bad param.
        CMP.W   #1,D3           ;should be just one param.
        BNE.S   EXIT10          ;return if not just one.
        MOVE.L  0(A6,A1.L),A1   ;get param into A1
        MOVE.L  #8191,D0        ;loop 8191 times (the size of the
        MOVE.L  #131072,A0      ;screen in long words)
LOOP10  MOVE.L  (A1)+,D1        ;get long word from second screen
        EOR.L   D1,(A0)+        ;exclusive or onto the screen
        DBF     D0,LOOP10       ;next

        CLR.L   D0              ;no errors
EXIT10  RTS                     ;return to BASIC
;code for BLOCK_CLS command

BLK_CLS MOVE    CA_GTLIN,A2     ;get params.
        JSR     (A2)            ;as long ints.
        BNE.S   EXIT6           ;error?
        MOVEQ   #ERR_BP,D0
        CMP.W   #2,D3           ;two params. please
        BNE.S   EXIT6           ;not two params?
        MOVE.L  0(A6,A1.L),D5   ;get first param.(pattern)
```

```
        MOVE.L  4(A6,A1.L),D4   ;get second param.(speed)
        MOVEQ   #ERR_OV,D0      ;check speed is less
        CMP.L   #32767,D4       ;than 32768
        BGT.S   EXIT6
        LSL     #6,D5           ;multiply pattern by 64 (each pattern
                                ;takes 64 bytes in memory)
        LEA.L   ORDER,A0        ;A0 equals beginning of patterns
        ADD.L   D5,A0           ;add pattern offset
        MOVEQ   #63,D0          ;loop through 64 blocks
LOOP6   CLR.L   D1              ;make sure D1 is clear
        MOVE.B  (A0)+,D1        ;get block number
        MOVE.B  D1,D2           ;
        AND.B   #7,D1           ; These calculations
        AND.B   #56,D2          ; take the block
        LSL     #4,D2           ; number and work
        LSL     #5,D2           ; out the address
        LSL     #4,D1           ; in screen memory
        ADD     D2,D1           ; that the blank
        MOVE    D1,A1           ; block should be.
        ADD.L   #131072,A1      ;add the beginning of screen RAM
        MOVE    #31,D3          ;block is 32 lines down
BLOOP6  CLR.L   (A1)+           ;
        CLR.L   (A1)+           ;clear 16 bytes
        CLR.L   (A1)+           ;on this line
        CLR.L   (A1)+           ;
        ADD     #112,A1         ;next line
        DBF     D3,BLOOP6       ;go back for next line
        MOVE    D4,D1           ;loop round speed
        DBF     D1,*            ;number of times
        DBF     D0,LOOP6        ;blank the next block

        CLR.L   D0              ;no errors
EXIT6   RTS                     ;return to BASIC

;code for BLOCK_CHANGE command

BLK_CHG MOVE    CA_GTLIN,A2     ;this code is the same
        JSR     (A2)            ;as that for BLOCK_CLS
        BNE.S   EXIT7           ;except that there are
        MOVEQ   #ERR_BP,D0      ;three parameters
        CMP.W   #3,D3           ;tested for in this line
        BNE.S   EXIT6
        MOVE.L  0(A6,A1.L),A2   ;and also the address of the second
        MOVE.L  4(A6,A1.L),D5   ;screen is taken off the stack
        MOVE.L  8(A6,A1.L),D4   ;from this line
        MOVEQ   #ERR_OV,D0      ;the rest is the same
        CMP.L   #32767,D4       ;as before
        BGT.S   EXIT7
        LEA.L   ORDER,A0
        LSL     #6,D5
        ADD.L   D5,A0
        MOVEQ   #63,D0
LOOP7   CLR.L   D1
        MOVE.B  (A0)+,D1
        MOVE.B  D1,D2
        AND.B   #7,D1
        AND.B   #56,D2
        LSL     #4,D2
        LSL     #5,D2
        LSL     #4,D1
        ADD     D2,D1
        MOVE.L  #131072,A1
        MOVEQ   #31,D3
BLOOP7  MOVE.L  0(A2,D1.W),0(A1,D1.W)   ;except for here where
        MOVE.L  4(A2,D1.W),4(A1,D1.W)   ;the memory is copied from
        MOVE.L  8(A2,D1.W),8(A1,D1.W)   ;the address passed to the
        MOVE.L  12(A2,D1.W),12(A1,D1.W) ;proc instead of being
        ADD     #128,D1                 ;cleared
        DBF     D3,BLOOP7
        MOVE    D4,D1
        DBF     D1,*
        DBF     D0,LOOP7

        CLR.L   D0
EXIT7   RTS

;code for LINE_CLS procedure

LIN_CLS MOVE    CA_GTLIN,A2     ;get long integers
        JSR     (A2)            ;from BASIC
        BNE.S   EXIT8           ;error?
        MOVEQ   #ERR_BP,D0      ;error bad parameter
        CMP.W   #2,D3           ;should be 2 params.
        BNE.S   EXIT8           ;exit if not
        MOVE.L  0(A6,A1.L),D5   ;get first param.
        MOVE.L  4(A6,A1.L),D4   ;get second
        MOVEQ   #ERR_OV,D0      ;error overflow
        CMP.L   #32767,D4       ;make sure speed
        BGT.S   EXIT8           ;is less than 32768
        LSL     #6,D5           ;multiply pattern by 64
        LEA.L   ORDER,A0        ;A0 = start of patterns
        ADD.L   D5,A0           ;go forward to start of correct pattern
        MOVEQ   #63,D0          ;loop 64 times
LOOP8   CLR.L   D1              ;clear D1, just in case
        MOVE.B  (A0)+,D1        ;get line number
        LSL     #8,D1           ;these lines work
        LSL     #1,D1           ;out the screen
        MOVE    D1,A1           ;address of the
        ADD.L   #131072,A1      ;start of the line.
        MOVE    #127,D3         ;
LLOOP8  CLR.L   (A1)+           ;loop to clear the line
        DBF     D3,LLOOP8       ;
        MOVE    D4,D1           ;loop for the
        DBF     D1,*            ;delay
        DBF     D0,LOOP8        ;go back for next line

        CLR.L   D0              ;no errors
EXIT8   RTS                     ;return to BASIC

;code for LINE_CHANGE procedure

LIN_CHG MOVE    CA_GTLIN,A2     ;Get long integers
        JSR     (A2)            ;
        BNE.S   EXIT9           ;exit if an error
        MOVEQ   #ERR_BP,D0      ;error bad param.
        CMP.W   #3,D3           ;3 params. ?
        BNE.S   EXIT9           ;exit if so
        MOVE.L  0(A6,A1.L),A2   ;get first param. (address of scre
        MOVE.L  4(A6,A1.L),D5   ;get second param.(pattern no.)
        MOVE.L  8(A6,A1.L),D4   ;get third param. (speed)
        MOVEQ   #ERR_OV,D0      ;error overflow
        CMP.L   #32767,D4       ;speed less than 32768
        BGT.S   EXIT9           ;exit if not
        LEA.L   ORDER,A0        ;A0 = start of patterns
        LSL     #6,D5           ;pattern no. * 64
        ADD.L   D5,A0           ;A0 = correct pattern
        MOVEQ   #63,D0          ;64 lines to change
LOOP9   CLR.L   D1              ;clear D1
        MOVE.B  (A0)+,D1        ;get line no.
        LSL     #8,D1           ;Work out
        LSL     #1,D1           ;the address in memory
        MOVE.L  #131072,A1      ;on the screen
        MOVEQ   #127,D3         ;128 long words to change
LLOOP9  MOVE.L  0(A2,D1.W),0(A1,D1.W)   ;transfer screen data
        ADDQ    #4,D1           ;
        DBF     D3,LLOOP9       ;go back for rest of line
        MOVE    D4,D1           ;delay is held in d4
        DBF     D1,*            ;
        DBF     D0,LOOP9        ;next line

        CLR.L   D0              ;no errors
EXIT9   RTS                     ;return to BASIC

;code for SCRN function

SCR_VAL MOVE.L  BV_RIP(A6),A1           ;put stack pointer in A1
        MOVE.W  BV_CHRIX,A2             ;reserve some space
        MOVEQ   #6,D1                   ;on the arithmetic
        JSR     (A2)                    ;stack
        SUBQ    #6,A1                   ;move the pointer
        MOVE.L  A1,BV_RIP(A6)           ;tell BASIC about new posi
        MOVE.W  #2066,0(A6,A1.L)        ;put three words on
        MOVE.W  #16384,2(A6,A1.L)       ;stack which make
        MOVE.W  #0,4(A6,A1.L)           ;up 131072 when put togeth
        MOVEQ   #RET_FP,D4              ;select return type

        CLR.L   D0
EXIT    RTS

PH_MEM

;data for the order the blocks/lines change in BLOCK_CLS,
;BLOCK_CHANGE, LINE_CLS and LINE_CHANGE.

ORDER   DC.B    18,36,50,14,30,33,53,20,2,48
        DC.B    38,9,34,43,4,47,59,62,11
        DC.B    24,6,27,52,57,41,8,22
        DC.B    28,21,31,12,25,37,60,45,17
        DC.B    1,7,26,10,63,40,23,13,39
        DC.B    56,42,58,46,3,54,0,61,5,55
        DC.B    16,19,44,29,32,49,51,35,15
ORDER2  DC.B    27,28,36,35,34,26,18,19
        DC.B    20,21,29,37,45,44,43,42
        DC.B    41,33,25,17,9,10,11,12,13
        DC.B    14,22,30,38,46,54,53,52
        DC.B    51,50,49,48,40,32,24,16
        DC.B    8,0,1,2,3,4,5,6,7,15,23
        DC.B    31,39,47,55,63,62,61,60
        DC.B    59,58,57,56
ORDER3  DC.B    0,8,1,2,9,16,24,17,10,3
        DC.B    4,11,18,25,32,40,33,26
        DC.B    19,12,5,6,13,20,27,34,41
        DC.B    48,56,49,42,35,28,21,14
        DC.B    7,15,22,29,36,43,50,57
        DC.B    58,51,44,37,30,23,31,38
        DC.B    45,52,59,60,53,46,39,47
        DC.B    54,61,62,55,63
        END
```

MICRODRIVE

THE PROGRAMS

Author	Language	Program Name	Price
1. Giles Todd	B	DIY Assembler	£5 £5

Feaured in the March to June 1985 issues of *QL User*, this complete two-pass assembler will assemble all 68008 code and support the assembler directives DRG, END, EQU, DC and DS.

---

2. Richard Cross — A+O — Mini Monitor — £3

Using approximately 3K of RAM, this handy utility will multi-task on your QL, leaving plenty of room for other programs. Commands include dumping registers, memory — and ASCII — machine code trace, register store, memory move, memory store — byte, word and long — and jumps. Featured in *QL User*, Octrober 1985.

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3. A Didcock — B — Connect4 — £1

A SuperBasic version of the classic four-in-a-row game where counters drop down slots in the vertical board. First printed in *QL User*, September 1985.

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4. Shergold & Tose — B — Golf — £2

With up to 50 courses of varying difficulty, lakes, rivers, bunkers and trees, this is a fine golf simulation. You decide the power and direction of each stroke, striving for a birdie, eagle or even an albatross. Your scorecard may be saved. This program was printed in the May 1985 issue of *QL User*.

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5. Williams & Holliday — A+O — Paladin — £5

Written completely in machine code, this excellent *Space Invaders* game was the basis of our games programming series, started in April 1985.

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6. Richard Cross — M+B — Sprite Animation — £2

This contains two programs from the April 1985 issue. The first is a SuperBasic multi-coloured sprite designer. The second contains machine code routines to animate the sprites on the screen.

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7. Steve Deary — B — Pacman — £1

A well-written maze game from the March 1985 issue. Almost 20 screens of increasing difficulty, including an invisible maze, make it a very versatile rendition of the arcade favourite.

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8. Andy Carmichael — B — Family Tree — £3

Based on an article in the August 1985 issue, this is an Archive program and database for setting-up and displaying large family trees.

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9. James Lucy — L — Composer — £3

Completed in *QL User*, October 1985 this QLiberated program will allow you to compose, play and amend your own melodies. The program will handle sharps, vary tempo, and even specify staccato and legato playing styles.

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10. Matthew Capp — B — Miners — £2

This interesting simulation, printed in the August 1985 issue, puts you in the role of the NCB, buying and selling coal and mines, hiring and firing miners, and raising or decreasing wages to match economic forces. The object is to be profitable but inexperienced players will find it difficult even to remain solvent.

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11. P J Smith — B — DIY Adventure — £1

From the February 1985 issue, this skeleton program requires you to slot in the details to create your own adventure programs.

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12. R Green — B — Othello — £1

This classic board game, printed in *QL User*, August 1985, can be played by one or two players. The display uses a 3D representation of the board. Average response time by the computer opponent is about 15 seconds.

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13. S J Ackers — S — Touch Type — £4

This program consists of a 13-lesson course for typing-in letters, words and phrases, a 700-word vocabulary, an interactive keyboard display and a fingering chart inas more than 30K of code. Scores are displayed based on the time and accuracy of typing. A reduced version of the program was printed in the August 1985 issue.

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14. Rob Sherratt — A+O — Fcopy — £4

The first part of this program was printed in the March 1986 issue of *QL World*. The program is an ultra-fast, general-purpose file spooler.

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15. Alan Prior — B — World Map — £2

From the March 1986 issue, this program will draw a full-screen, multi-coloured map of the world for geography buffs.

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16. J M Dower — B — Mushyman — £2

Printed in the June and July 1986 issues, this provides speedy SuperBasic arcade action as you munch your way round the screen.

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17. Tony Quinn — S — CAD QL — £4

CAD design programs are particularly suited to the QL. This version from the September 1986 issue includes features such as rubber-banding and a user-definable symbol library.

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18. Stuart Campbell — M+B — Attack of the Things — £3

Typical science fiction horror arcade action as yet more nasties descend on harmless QL owners. Featured in the October 1986 issue of *QL World*.

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19. Karl Jeffery — M+B — Starport 2001 — £3

Fast machine code action in this November 1986 version of the *Galaxians* arcade game.

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20. Marcus Jeffery — S — QL Go — £4

The oriental game of Go is so complex that even mainframe programs are easily beaten by novice players. To the best of our knowledge, this 15x15 version from the April and May 1986 issues is the only one available for the QL.

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21. J P Hartley — B — Britain — £2

Another program for geography buffs from the November 1986 issue of *QL World*. This is a round-Britain geography quiz.

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22. KBG Judson — B — Darts — £2

Program of the Month from December 1986. This popular pub pastime requires good hand and eye co-ordination to stop a moving cursor on the on-screen board.

EXCHANGE

23. Neil Taylor S **Window Designer** £2
This useful routine from the February 1987 issue allows you to set up windows on the screen. A procedure for use in your programs allows you to set the position and size of a window using the cursor keys.

24. J F Tydeman S **Design 3D** £4
Published in the March and April 1987 issues, this program will allow you to produce 3D screen designs with the minimum of fuss and aggravation.

25. D Carmona B **Stellaris** £4
Program of the Month from June 1987. This is an extensive real-time space adventure game against the computer, including economic simulations, lunar landing and superb graphics.

26. Robert Noble A+B+O **Video Effects Box1** £3
These machine code SuperBasic extensions allow you to manipulate your screens, save and recall them from memory and clear them in interesting ways. Program of the Month for July 1987.

27. H R Pendry B **Pontoon** £3
A graphic version of the classic card game. You play against the computer. Features include changing banker on royal pontoons, accurate betting, five card tricks and so on. Printed in the July 1987 issue of *QL World*.

28. Kenneth Cameron B **Picture Puzzle** £2
This short but interesting program from the July 1987 issue sets up an 8 x 8 sliding block puzzle with on-screen graphics. You can select sliding numbers or load your own picture to solve.

29. Peter Etheridge B **Bridge** £4
An excellent version of this popular card game. Features include accurate computer bidding, automatic or manual play, replay hands, correct scoring, save and load positions and much more. Essential for card enthusiasts.

30. Charles Gerrard B **Psycho** £4
Based on an article in the July 1987 issue, this is an excellent version of the famous *Eliza* program. The cartridge contains a script design program, a pre-prepared script containing more than 50 keywords and an application program. Though written in SuperBasic, complex list processing makes this version extremely fast.

31. B Otridge **Crossword** £5
Sold originally as a commercial program, this is the perfect aid for crossword fanatics. The program provides access by word length to a dictionary of about 12,500 words, to help solve those elusive crossword clues. Note: This program requires two Microdrive cartridges.

32. Phillip Sproston B **Advent2** £4
SuperBasic arcade adventure with a humorous slant. A variety of rooms, robots and problems will keep you on your toes. Full instructions included.

33. Leslie Fahidy B **Clock** £3
This is a complete version of the clock program, described in the June and July 1987 issues of our QL Education series. An on-screen clock can be used to set or read the time.

34. E. Bamber **QL Conversion/ Calculator** £2
Comprising weights and measures units conventions and reverse Polish calculation, this excellent utility will convert almost anything to anything. Completely menu-driven, it is very easy to use. Featured in the July 1987 issue.

KEY

B	=	SuperBasic
A+O	=	Assembler and Object Code
M+B	=	Machine Code and Basic Loader
A+B+O	=	Assembler and Basic Loader and Object Code
S	=	Supercharged
L	=	QLiberate

THE ALL-NEW MICRODRIVE EXCHANGE

Microdrive Exchange has always been a popular feature of *Sinclair QL World* and in our constant efforts to improve the magazine, we are expanding the Exchange to bring you even more quality programs at budget prices.

To achieve those results we have altered the format of the Exchange. Rather than calculating the number of sectors required by each program and sending the appropriate number of cartridges, we have now made it a one-program, one-cartridge system. So if you would like, say, four programs, then, regardless of length, you will need four cartridges.

There are a number of advantages to the system. First, the service will be much faster, because programs can be copied in advance. Second, rather than having to ensure having the article for documentation, we will be able to supply Quill documents on the Microdrive, if needed, for future programs.

Finally, for all new programs on the Exchange, rather than just receiving the machine code version, the Supercharged version or whatever, we will be able to supply assembly listings, hex loaders and original SuperBasic versions on the same cartridge, so that you can look at and amend programs.

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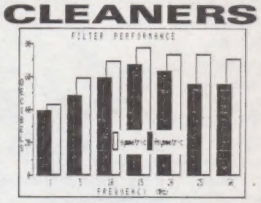

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METACOMCO ASSEMBLER ..... £ 29.00
METACOMCO BCPL ..... £ 49.00
METACOMCO LISP ..... £ 49.00
METACOMCO PASCAL..... £ 69.00
METACOMCO 'C' ..... £ 79.00
METACOMCO APL..... £ 89.00
PRO FORTRAN 77 ..... £ 89.00
PRO PASCAL ..... £ 89.00
QL LIBERATOR..... £ 69.00
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FORTH + REVERSI ..... £ 35.00

EIDERSOFT SPOOK ..... £ 9.00
EIDERSOFT BJ 3D ..... £ 9.00
EIDERSOFT BJ RETURNS ..... £ 9.00
EIDERSOFT KARATE..... £ 9.00
EIDERSOFT CITADEL ..... £ 9.00
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LEISURE GENIUS SCRABBLE ..... £ 12.00
HYPERDRIVE..... £ 12.00
STEVE DAVIS SNOOKER ..... £ 12.00
DIGITAL SUPER ARCADIA ..... £ 9.00
DIGITAL DROIDZONE ..... £ 9.00

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QFLASH RAMDISK/TOOLKIT (EPROM) ... £ 25.00
TOOLKIT II ON EPROM ..... £ 29.00
TOOLKIT II ON CART ..... £ 28.00
DIGITAL MEDIA MANAGER ..... £ 35.00
THE EDITOR ON CART (128K VER.) .... £ 24.00
THE EDITOR ON DISK (640K VER) ..... £ 39.00
TALENT TECHNIKIT ..... £ 24.00
TALENT QIMP ..... £ 29.00
TALENT BASIC ALLY ..... £ 29.00
DISK & PRINT SPOOLER..... £ 9.00
TALENT SIDEWAYS ..... £ 19.00
DIGITAL SPRITE GENERATOR ..... £ 29.00
SECTOR TASKMASTER ..... £ 25.00
TURBO TOOLKIT..... £ 19.00
QMON MONITOR/DEBUGGER ..... £ 18.00
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BETTER BASIC EXPERT SYSTEM ..... £ 29.00

BRIDGE PLAYER II ..... £ 17.00
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TOUCH TYPIST..... £ 12.00
DATALINK 3D SLIME ..... £ 11.00
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DIGITAL SUPER ASTROLOGER ..... £ 22.00
OMEGA ..... £ 14.00

ALL PRICES INCLUDE VAT & CARRIAGE